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PART II.

THE

FLORA SYLVATICA

FOR

SOUTHERN INDIA:

CONTAINING QUARTO PLATES OF ALL THE PRINCIPAL TIMBER TREES IN SOUTHERN INDIA AND CEYLON, ACCOMPANIED BY A BOTANICAL MANUAL, WITH DESCRIPTIONS OF EVERY KNOWN TREE AND SHRUB, AND ANALYSIS OF EVERY GENUS NOT FIGURED IN THE PLATES.

BY

MAJOR R. H. BEDDOME,

CONSERVATOR OF FORESTS.

AMENDED COPY

OF

PART II

OF THE

"FLORA SYLVATICA OF SOUTHERN INDIA."

Madras:

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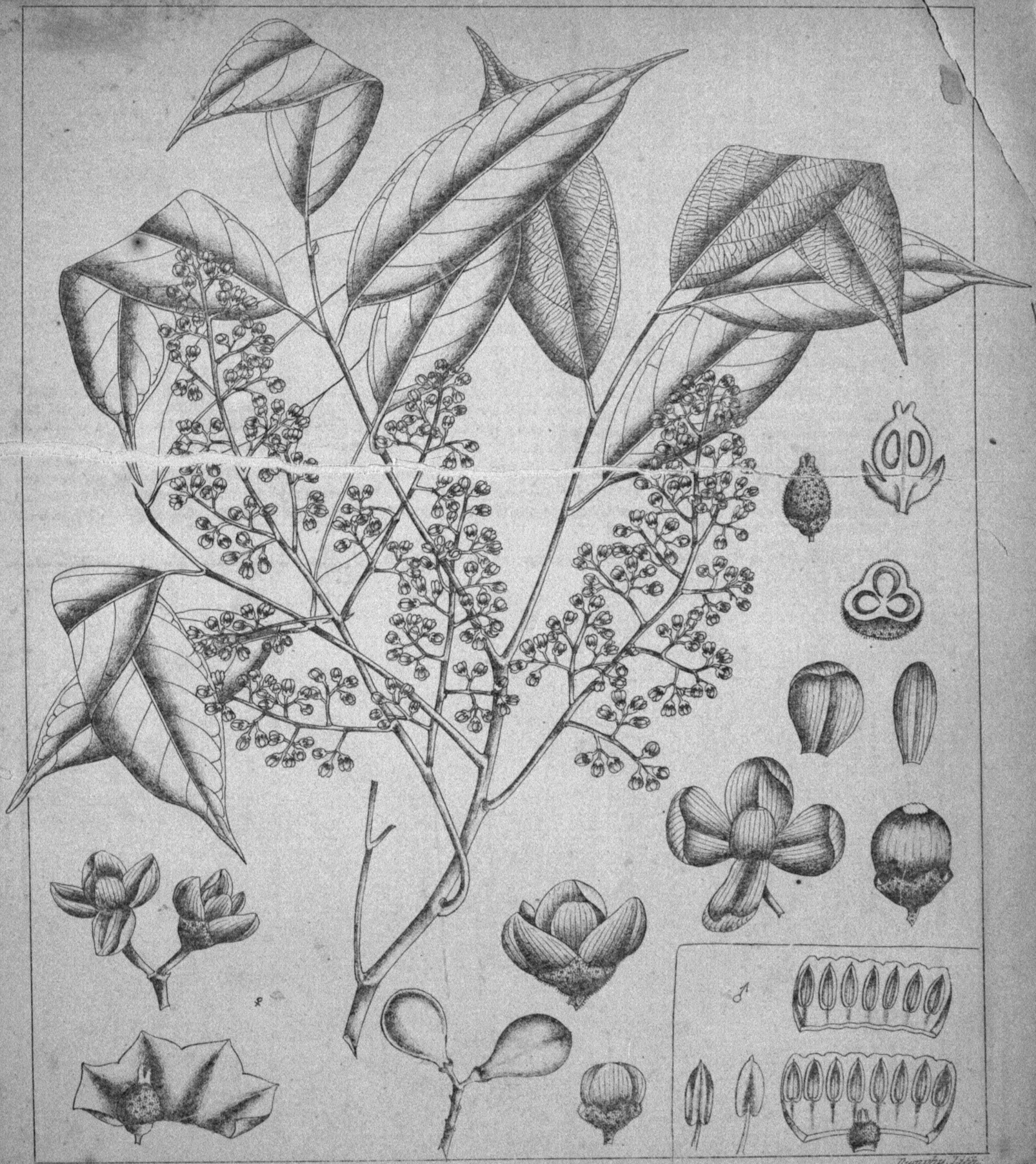
156

AMOORA LAWII. (Nat. ord. Meliaceæ.)

For. Gen. Char. see letter press to Pl. cxxxii.

AMOORA LAWII. (Wight.) A middling sized tree, all the young parts and the inflorescence scaly with yellowish brown leprous scales, leaves unequally pinnate generally about 8 inches each way, leaflets 2-3 opposite or alternate pair with a terminal odd one, leaflets lanceolate acuminate about 4 inches long by 1½ broad, petioles 2-3 lines long, panicles axillary much branched, calyx scaly more or less 4-toothed, petals 4, one of which is much narrower than the others, stamen-tube orbicular subentire or crenated at the apex, anthers 8 rarely only 7, attached by the back near the base to an evident filament which is adglutinate to the calyx tube and rises from nearly its base, ovary scaly, 3-celled, cells 1 ovuled, ovules attached to the axis a little above the base, stigmas 3 sessile, fruit (immature) pear-shaped size of a plum indehiscent? abounding in white resinous juice.—Nimmonia Lawii, *Wight. Cal. Journ. of Nat. His.* vii. 13. Nemedra Nimmonli, *Dalz. in Bomb. Flora. p.* 37.

A middling sized tree, Bombay and Canara ghat forests, and probably elsewhere on our western chain of ghats; called Boorumb in the Bombay Presidency.



Govindoo, del.

Dunphy Lith.

Amoora Lawii (Wight)

HEYNEA AFFINIS. (Nat. ord. Meliaceæ.)

HEYNEA. *Roxb.*—GEN. CHAR. Calyx short, 4-5 cleft imbricate, petals 4-5 oblong erect imbricate, staminal-tube deeply 8-10 cleft, divisions linear sharply 2-toothed at the apex and each bearing an anther between the teeth, anthers slightly exserted, disk fleshy annular, ovary immersed in the disk depressed, 2 3 celled, style short thickened upwards and clubbed at the apex, stigma 2-3 toothed, cells of the ovary 2 ovuled, ovules pendulous from near the apex of the axis, collateral. Capsule fleshy 1 celled 2 valved, 1 seeded, seed arillate, radicle superior. Trees or shrubs, glabrous or pubescent, leaves unequally pinnate, leaflets opposite, panicles axillary long peduncled, corymbose, flowers small.

HEYNEA AFFINIS. (Juss.) A middling sized tree, glabrous, leaves unequally pinnate 12-20 inches long by 10-16 broad, leaflets 3-4 opposite pair with a terminal long peduncled odd leaflet, glabrous above, beneath white and glaucous, but also glabrous except a few distant white hairs on the costa and over the surface (only visible with a lens), obliquely ovate to oblong very unequal at the base and ending in a long terminal very sudden acumination, 4-8 inches long by 2½-3½ broad, the parallel primary veins very prominent beneath, petioles from less than ¼ to ¾ inch long (terminal one 1½ inches,) panicles axillary about ⅔rds the length of the leaves, corymbosely branched at the apex of the long glabrous peduncle, branches minutely pubescent and furnished with minute hairy bracteoles at the branchlets, flowers white about 2 lines long, calyx corol and staminal-tube pubescent, anthers yellow obtusely apiculate. fruit oblong or roundish about 6 lines long by 5 broad bursting when ripe into 2 valves disclosing the solitary seed surrounded by its aril. *Ad. de Juss. in Mem. Mus.* 19. Heynea trijuga, *Roxb. Fl. Ind.* ii. 390 ?

A very ornamental tree, common in many localities on the western mountains of the Madras Presidency, from 2000 *feet upwards* (*Conoor* 6000 *feet, abundant, Bolampatty valley* 3000 *feet, very abundant.*)

Govindoo del. Dumphy Lith.

Heynea affinis (Juss.)

BEDDOMEA SIMPLICIFOLIA. (Nat. order Meliaceæ.)

BEDDOMEA. *Hook. fil.*—GEN. CHAR. Calyx 5-6 partite, lobes broadly ovate imbricate, petals as many orbicular, equal in size, or the interior smaller, much imbricate: stamen-tube short or globose, crenulate at the apex, anthers 5-6 sessile at the apex of the tube partially or almost wholly exserted, connective very thick, cells narrow marginal at length confluent at the apex; ovary short hirsute more or less immersed in an inconspicuous disk 3 celled, cells 2 ovuled, ovules collateral attached to the axis at or a little above the middle, style short thick, stigma 3 lobed pyramidal, fruit coriaceous oblong or ovate or subglobose often acute at the apex, more or less ribbed and densely covered with close-set scurfy and stellate tomentum, tardily dehiscent 2-3 celled but the partitions very thin and often obsolete, seeds 3-5 large more or less angled exarillate, cotyledons superposed, radicle centripetal. Trees or shrubs with more or less scurfy pubescence, leaves simple trifoliate or pinnate, leaflets entire, opposite or alternate, flowers in axillary panicles or racemes or solitary in the axils.

BEDDOMEA SIMPLICIFOLIA. (Bedd.) A tree up to 3 feet in girth and 25 in height, young parts furnished with scurfy scales, leaves from lanceolate to broadly elliptic more or less acute slightly scurfy when young, at length quite glabrous 3-6 inches long by 1¼-3¼ broad, veins parallel and prominent beneath, petioles ½-¾ inch long much thickened at the apex (but not apparently jointed,) flowers very variable in size from 1½ to nearly 5 lines in diameter, panicles or racemes from much shorter than the leaves to filiform and much longer or the flowers are occasionally solitary in the axils, pedicels 1-3 lines long, pubescence of the panicle and calyx from densely rufo-tomentose to scurfy, flowers 5 6 merous, petals equal or subequal orbicular slightly scaly in the centre of the back, stamen-tube in the paniculate and racemed flowers large globose crenated at the apex the inside sometimes furnished with prominent corrugations, anthers with a very large thickened connective, attached by their back near the apex of the tube, and partly exserted; in the solitary flowers the staminal tube is smaller plane inside and the anthers cover the whole length of the tube the apices being slightly exserted, ovaries of both flowers as in the genus and furnished with ovules, fruit oblong size of a pigeon's egg more or less acute, densely rusty-tomentose.

Var. α. racemes much shorter than the leaves, flowers large 4 5 lines in diameter, rufo-tomentose.

Wynad, Tinnevelly hills and Travancore, 2-4000 feet.

Var. β. parviflora, panicles very small not much longer than the petioles, flowers 1-2 lines in diameter, rufo-tomentose.

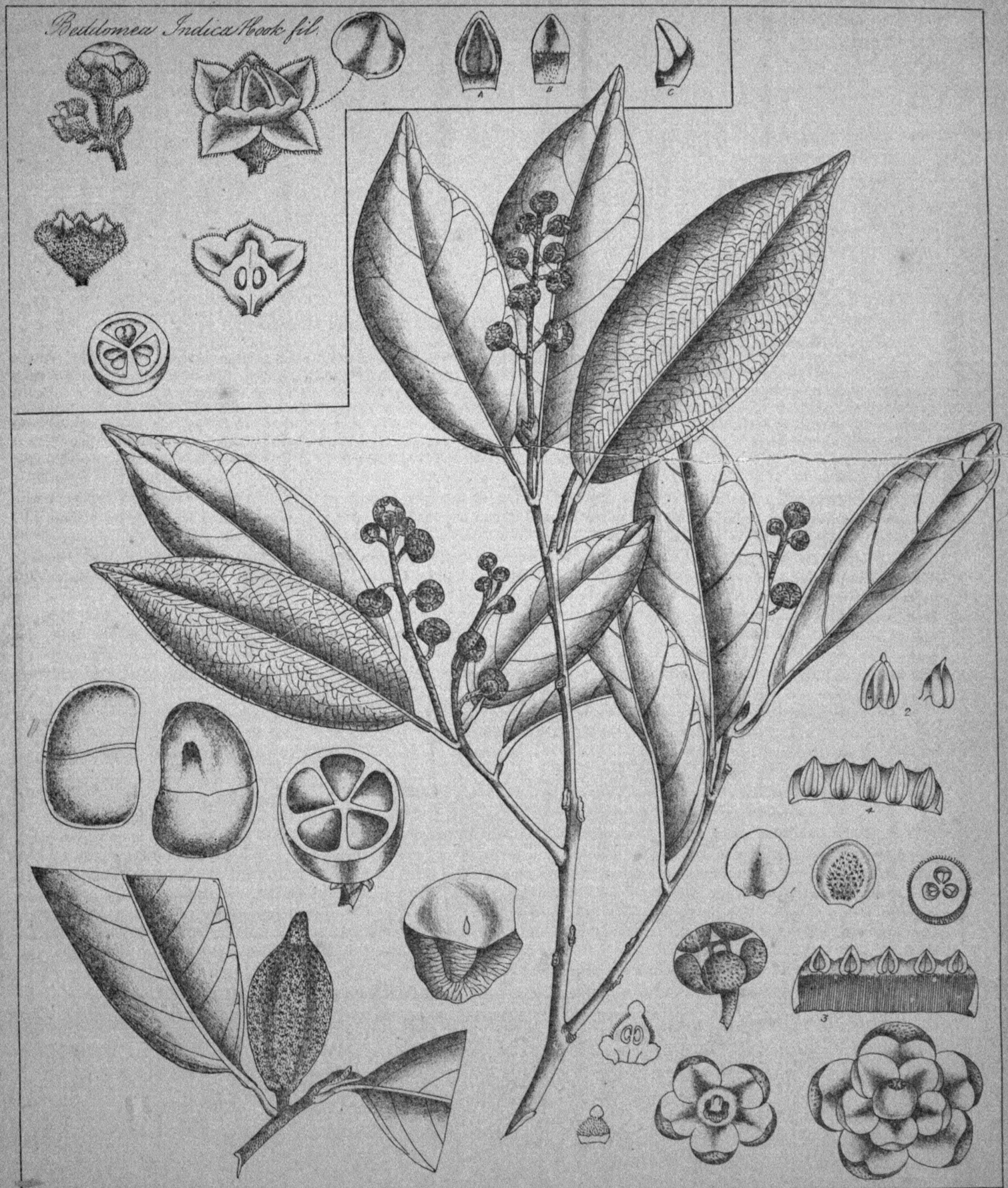
Anamallay hills and Pulney Hills, 3-4000 feet.

Var. γ. racemosa, racemes filiform longer than the leaves, pubescence scurfy.

Wynad, Coorg and South Canara.

It was only after a long acquaintance with all these forms in a growing state that I made up my mind to unite all the simple leaved forms of Beddomea under one species. All the varieties occasionally have solitary axillary flowers which differ a little in their anthers, but as the fruit is always solitary in the axils, it is probable that these are the only truly fertile flowers, though all the flowers have ovules in the ovaries. Vary. γ. resembles B. Indica in its racemes, but its staminal tube and anthers are the same as the other varieties of this species. The species figured is vary. α. (from Travancore). Fig. 1 gives the front and back view of the petals. Fig. 2 front and side view of the anthers. Fig. 3 the staminal tube and anthers of the panicled and racemed flowers. Fig. 4 the stamen tube of the solitary axillary flowers. At the top of the plate I have given dissections of the flowers of B. Indica (*Hook. fil.*) vide Manual. A. B. and C. are front, back and side view of one of the anthers.

The different varieties are all small trees and very common throughout the Western ghat forests from Canara down to Cape Comorin.



Govindoo, del.

Dumphy, Lith:

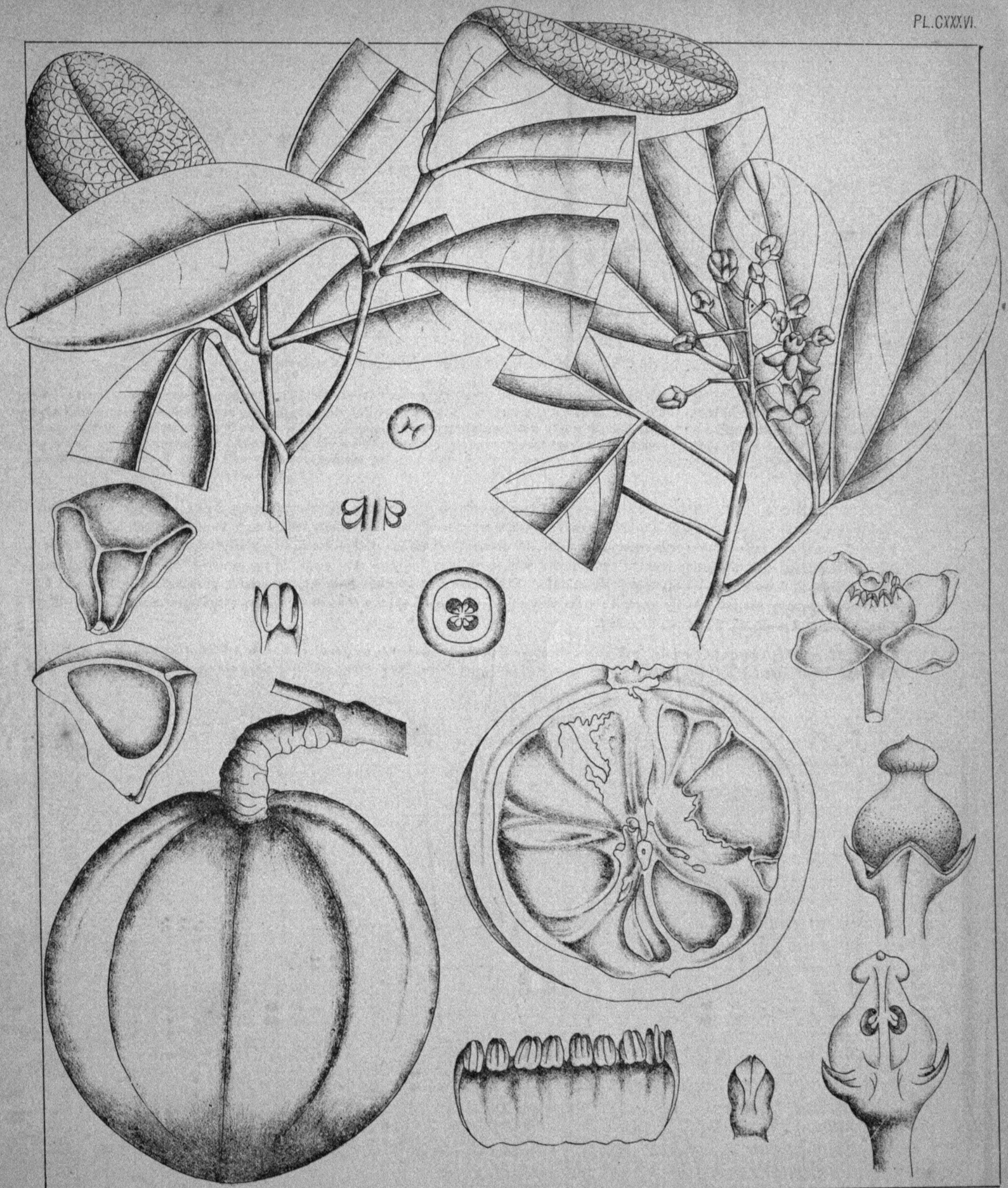
Beddomea simplicifolia. (Bedd.)

CARAPA MOLUCCENSIS. (Nat. ord. Meliaceæ.)

CARAPA. *Aubl.*—GEN. CHAR. Calyx small, 4 or 5 lobed. Petals 4 or 5 free, imbricate in the bud. Staminal tube urceolate, crenate or lobed, anthers 8 or 10, within the summit. Disk thick surrounding the ovary. Ovary 4 to 5-celled, with 2 to 6 ovules in each cell, style short, with a large disk-like stigma. Capsule globular or ovoid, fleshy or woody, the dissepiments often disappearing. Seeds several in a compact mass round the remains of the central axis, large, thick, with a ventral hilum; testa spongy; cotyledons superposed often united; radicle dorsal. Maritime trees. Leaves pinnate with entire leaflets. Panicles axillary.—Xylocarpus, *Kœn.*;—*Benth. Fl. Aust.* 1. *p.* 386. Persoonia, *Willd. Sp. Pl.* ii. 331. Touloucouna and Racapa, *Rœm Synops.* 123.

CARAPA MOLUCCENSIS. (Lam.) A tree glabrous in all its parts. Leaflets 4, rarely 2 or 6, opposite, ovate, obtuse, shortly acuminate or rarely acute, 2 to 3 or rarely 4 inches long, somewhat coriaceous, reticulate. Panicles short, loose, and few flowered, sometimes reduced to simple racemes or with few divaricate branches. Calyx small, irregularly lobed. Petals 4 or rarely 5, 2½ to 3 lines long. Staminal tube crenate or splitting into short lobes. Ovary very small, in the centre of a large thick depressed disk. Ovules 2, 3, or 4 in each cell, excessively minute. Fruit often 3 or 4 inches diameter, irregularly globular. Seeds usually 4 to 6, large irregularly shaped, closely packed; testa very thick, of a hard spongy consistence.—Xylocarpus granatum, *Kœn*;—*Willd. Spec. Pl.* ii. 328;—*Benth. Fl. Aust.* 1. *p.* 387.

This tree is a native of the coast in Malabar, Ceylon and in the Sunderbunds, and is also found in Africa, Australia, Madagascar and the Malay Archipelago; in Tamil it is called Kandalanga, and in Ceylon Kadul. The drawing and dissections are communciated by Dr. Thwaites.



Govindoo, del.

Dumpsey Lith:

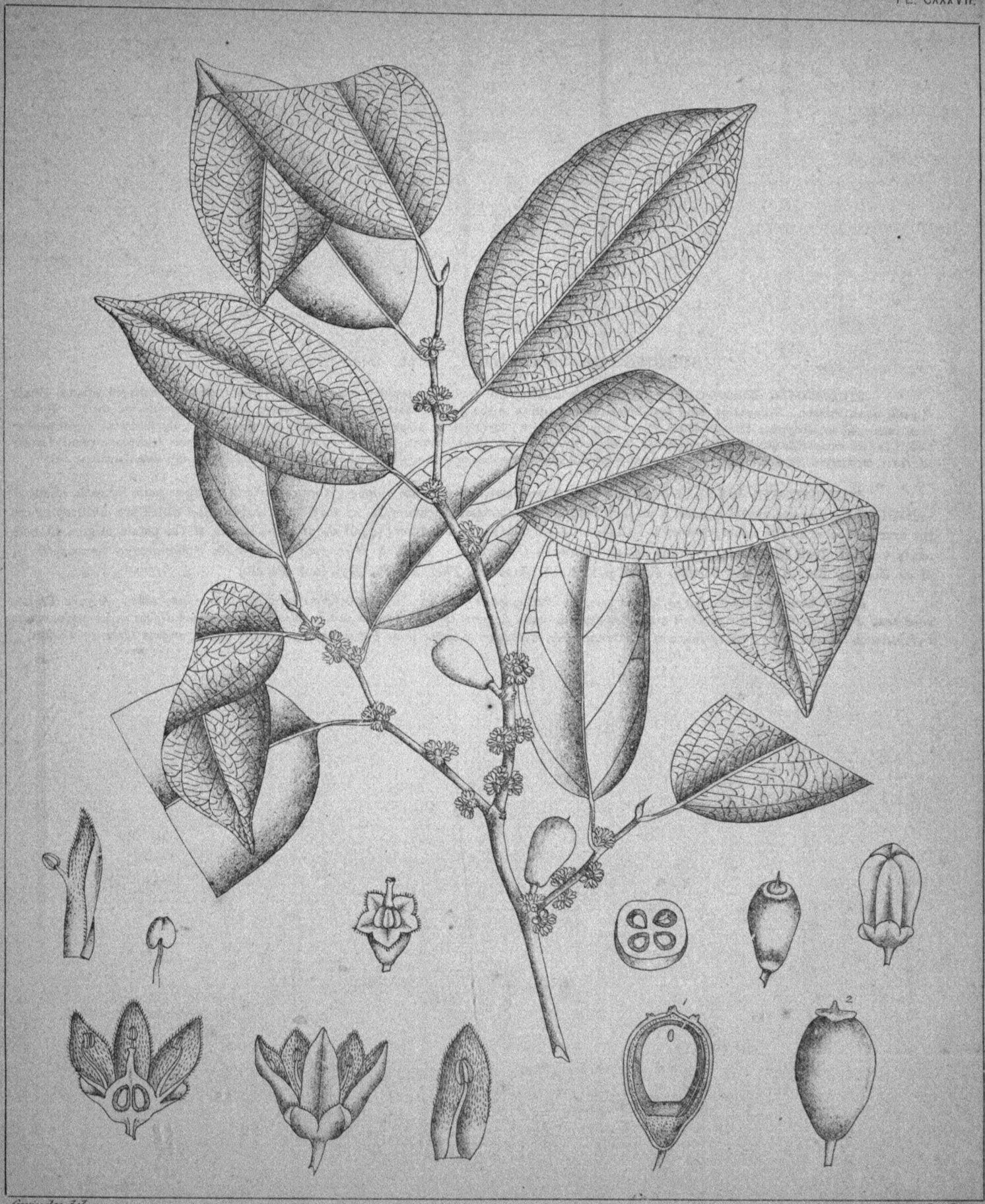
Carapa Moluccensis (Lam:)

STROMBOSIA CEYLANICA. (Nat. order Olacineæ.)

STROMBOSIA. *Blume.*—GEN. CHAR. Calyx limb small, 5 lobed; lobes broadly ovate or deltoid rotundate, in fruit enlarged, adnate. Petals 5, perigynous, valvate. Stamens as many as and opposite and adnate to the petals, filaments shortly free above, ovary broad, inserted upon a disk or semi-immersed or altogether immersed, 3-5 celled nearly to the apex; style short; stigma obtuse, slightly thickened, obscurely lobulate; ovules pendulous, 1 in each compartment. Fruit drupaceous. Seed pendulous with a minute embryo within the apex of a fleshy albumen. Glabrous trees. Leaves alternate, coriaceous. Flowers small, in axillary cymes or fascicles, pedunculate or sessile.—Sphœrocarya, *Dalz. A. DC. Prod.* xiv. 629. Lavallea, *Baill.*

STROMBOSIA CEYLANICA. (Gardn.) A large tree, leaves ovate oblong glabrous acute at the apex paler beneath, about 5 inches long by 2 broad, petioles about ½ an inch long, flowers subsessile glomerate on very short scaly nodes which are axillary or on the branches between the leaves, flowers 1-1½ lines long, calyx lobes rounded very small about ⅓ the length of the petals, stigma 4 lobed ovary 4 celled, fruit (immature) pyriform scaly. *Gard. in Calc. Journ. of Nat. Hist. vol.* vi. *p.* 350. Sphœrocarya leprosa, *Dalz. Hook. Jour. of Bot.* iii. 34 and *Bombay Flora, p.* 223. S. Javanica, *Thw. En. Pl. Zeyl.* (not *Blume.*)

Ceylon, Canara ghats, a large timber tree, the wood is white and durable, the drawing and dissections are taken from a Ceylon specimen. Fig. 1. *and* 2 *of the ripe fruit are copied from Blume's figure of S. Javanica, a closely allied species, which differs in its pedunculate inflorescence. I have only a poor specimen of the Canara tree, it appears to be the same, but the style is longer and the stigma entire or* 2 *lobed.*



Govindos, del: Durapky, Lith:

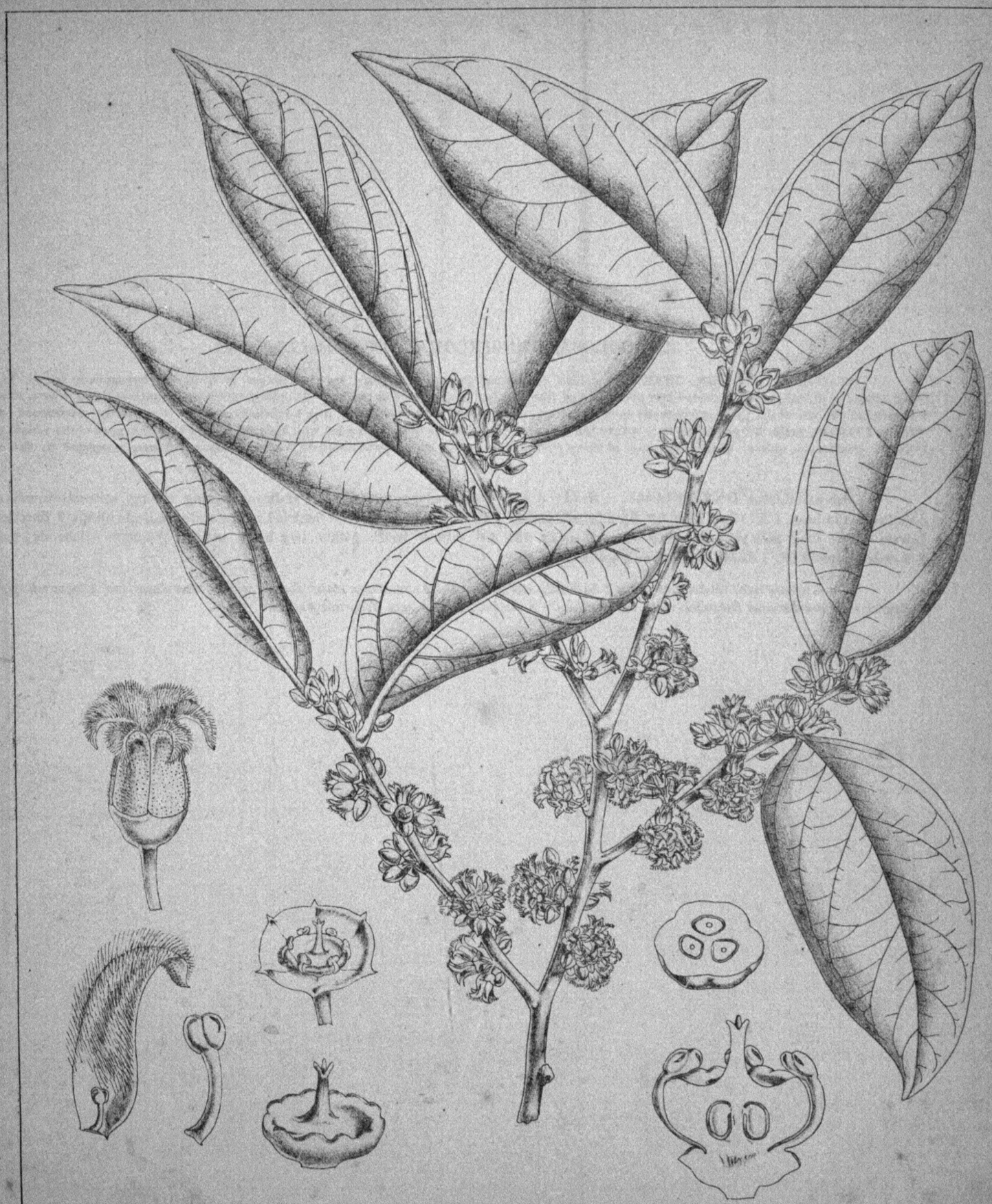
Strombosia Ceylanica (Garl)

ANACOLOSA DENSIFLORA. (Nat. order Olacineæ.)

ANACOLOSA. *Bl.*—GEN. CHAR. Calyx small cyathiform truncate denticulate free, unchanged in fruit, disk hypogynous adnate to the ovary increasing in fruit, petals 6 inserted into the margin of the disk, valvate, concave at the base where they embrace the anthers, hairy above, stamens 6 inserted at the base of the petals and opposite to them, anthers ovate, ovary immersed in the disk 1-3 celled generally imperfectly partitioned, style entire or 3 toothed, ovules 2-3 pendulous from nearly the apex of the axis, drupe baccate 1 seeded with a ringed margin near the apex of the adnate disk, putamen crustaceous, embryo small in the apex of fleshy albumen, radicle superior, leaves alternate entire coriaceous, flowers congested in the axils pedicellate.

ANACOLOSA DENSIFLORA. (Bedd.) A lofty tree, branches terete, leaves glabrous shining oblong, obtusely acuminate, rounded at the base, 4-5 inches long by 1½-2 broad, petiole ¼ inch long, flowers 7-20 fascicled in the axils, pedicels about 3 lines long, flowers 3 lines long, pale yellowish very fragrant, calyx with 4-6 minute teeth, petals very hairy within, filaments glabrous, ovary 2-3 celled, style 3 fid. *Bedd. Linn. Trans. vol.* XXV. *p.* 211.

This is a very lofty timber tree which I have only met with in the Anamallays, moist forests at 2000 *feet elevation (Anagoondi shola,) it flowers in November and December, when the boughs are a perfect mass of very fragrant flowers.*



Govindoo, del: Dunephy, Lith.

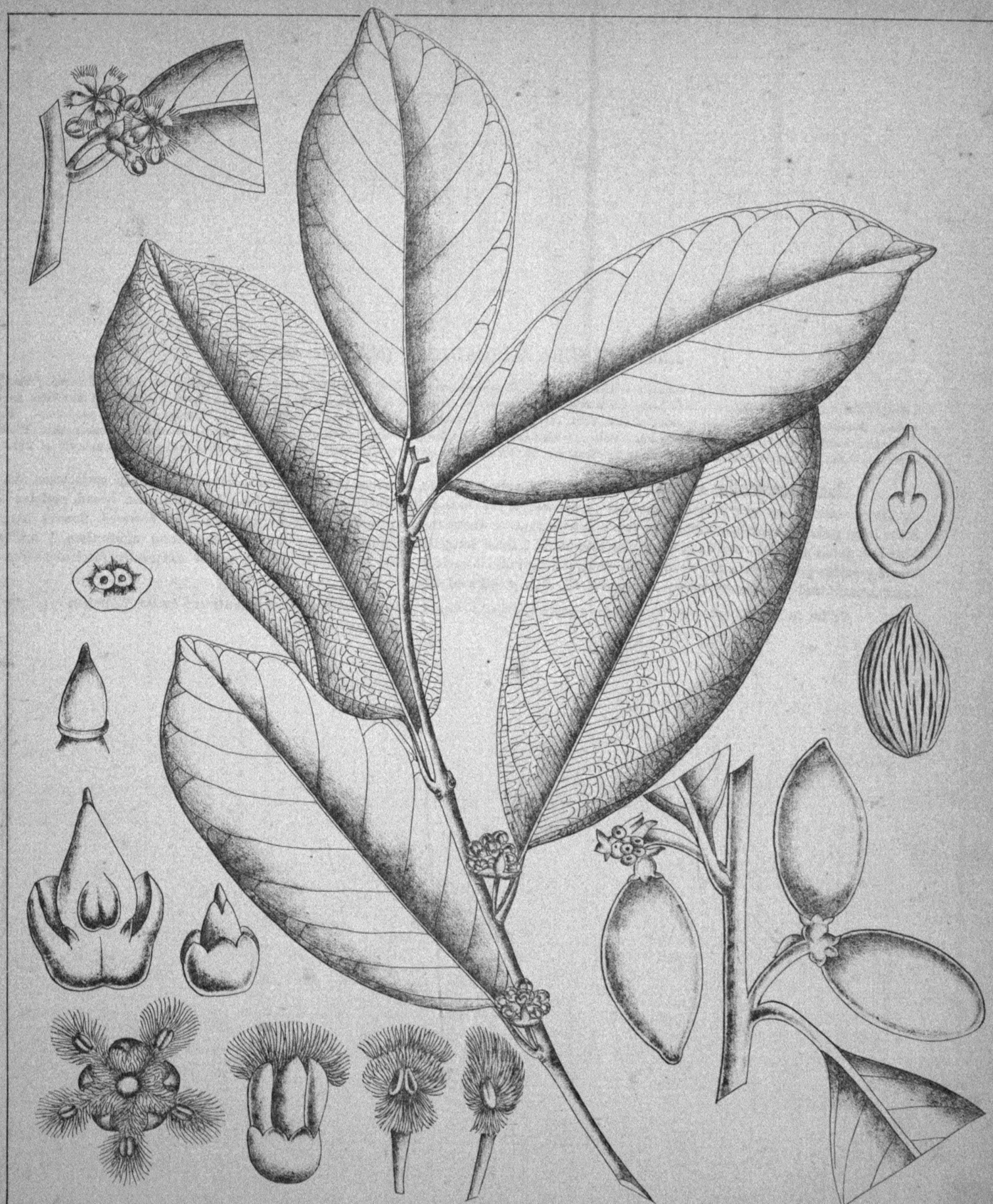
Anacolosa densiflora (Bedd.)

LASIANTHERA APICAULIS. (Nat. order Olacineæ.)

LASIANTHERA. *P. de Beauvois.*—GEN. CHAR. Flowers hermaphrodite (or polygamous.) Calyx shortly and broadly 5 lobed. Petals 5 hypogynous, valvate in æstivation. Disk fleshy, unilateral or inconspicuous. Stamens 5, alternate with the petals, free or adnate at the base to the petals; anthers tufted behind with a pencil of soft hairs. Ovary free, 1 celled, narrowed above; stigma minute. Ovules geminate, pendulous. Fruit coriaceous, oblong. Seed pendulous, with a small embryo within the apex of a fleshy albumen. Glabrous trees or shrubs. Leaves alternate entire. Flowers small, capitate; peduncles umbellate, leaf opposed.—Stemonurus, *Blume Bijdr. ex parte.* Urandra, *Thw. in Hook. Kew Jour. of Bot. vol.* vii. *p.* 211.

LASIANTHERA APICAULIS. (Thw.) A very large tree, branches terete glabrous, leaves entire very coriaceous, oblong or obovato-oblong abruptly shortly-acuminate; narrowed at the base paler beneath 4-6 inches long by 2-3 inches broad, petioles 5-8 lines long, peduncles axillary solitary or twice shorter than or about the length of the petiole, capitula 7-12 flowered, flowers hermathrodite, petals greenish, purple towards the base about 2 lines long, drupe oblong sub acute 1¼ inches long more than ½ an inch broad greenish purple, putamen woody with several longitudinal cavities filled with soft cellular matter externally fasciculate fibrous, testa consolidated with the pericarp. *Thw. En. Pl. Zey. p.* 43 *and* 405.

Ceylon in damp forests 1000 *to* 3000 *feet elevation, called Urukanu; the dissections are communicated by Dr. Thwaites.*



Govindoo, del. Dumphy, Lith.

Lasianthera apicaulis (Thw.)

APODYTES BENTHAMIANA. (Nat. order Olacineæ.)

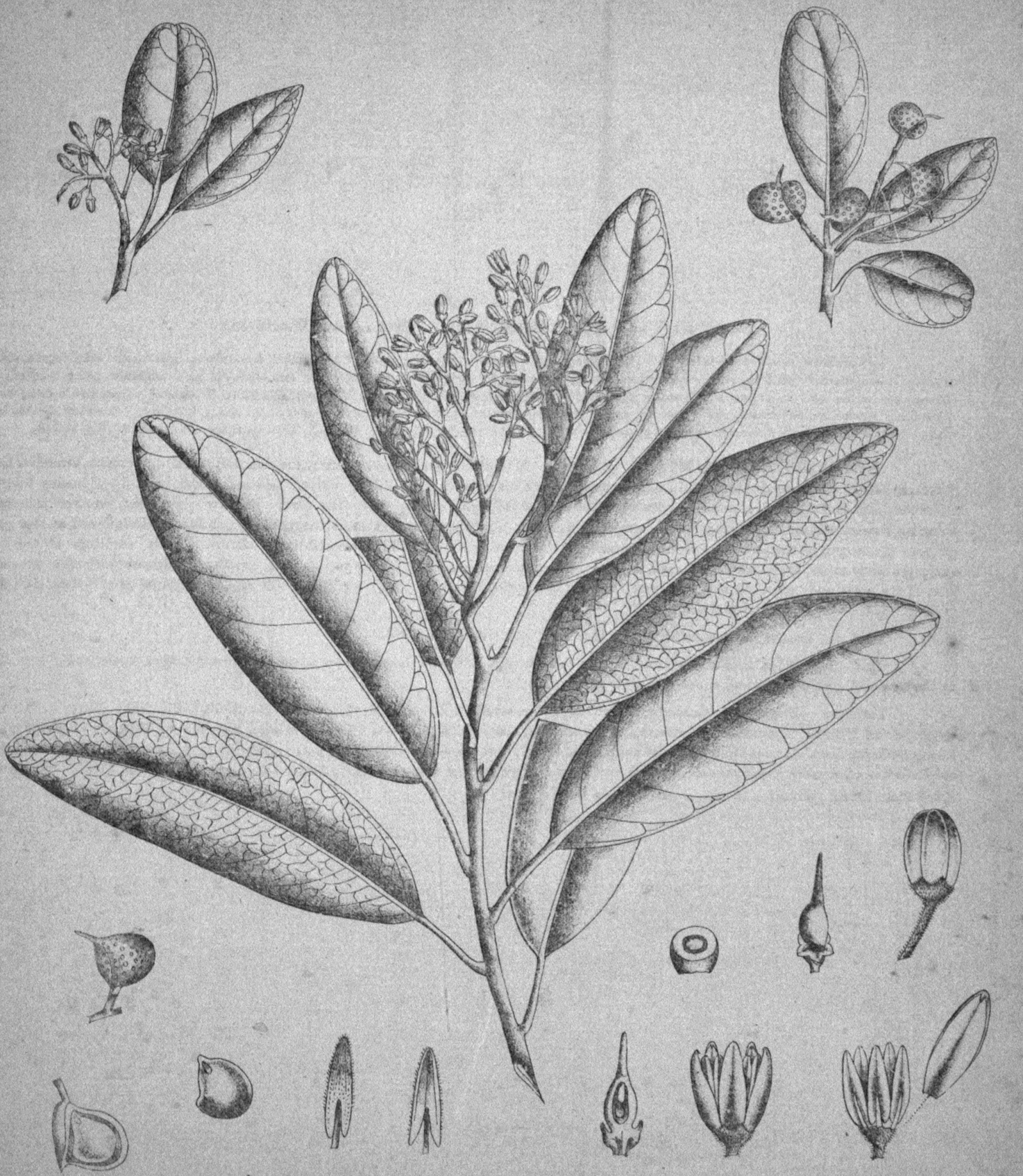
APODYTES. *E. Meyer.*—GEN. CHAR. Calyx small 5 toothed or partite, petals 5 hypogynous free valvate glabrous or subglabrous, stamens as many as and alternate with the petals free or very shortly adherent to their base, anthers linear to lanceolate oblong or sagittate, ovary 1-celled, style filiform more or less oblique, stigma small, ovules 2 pendulous sub-superposed, drupe baccate obliquely ellipsoidal or rounded sometimes bearing on one side a fleshy appendage, nut crustaceous or woody, seed 1 pendulous, with a small embryo near the apex of the fleshy albumen. Trees or shrubs, leaves entire alternate penniveined, flowers in terminal panicles or axillary fascicles.—Raphiostyles, *Planch?* Nothapodytes, *Blume. Mus. Bot.* 1. 248.

APODYTES BENTHAMIANA. (Wight.) A middling sized tree young parts minutely aureo-pubescent, branches terete glabrous, leaves alternate coriaceous glabrous (turning quite black in drying) oblong elliptic obtuse at both ends 3½-4 inches long by 1½ broad, petiole ¾-1¼ inches long, panicles terminal contracted rigid shorter than the leaves slightly pubescent, bractes minute or wanting, flowers white 3 lines long, calyx minute 5 toothed slightly pubescent as is the pedicel, petals elliptic inflexed at the point, stamens the length of the petals, anthers pubescent on the front face and sides, basifixed linear obtuse, deeply sagittate at the base, ovary glabrous ovate, style lateral straight, stigma inconspicuous truncated, drupe semi-ovate reniform crowned with the persistent base of the style and furnished with a lateral scutelliform appendage. *Wight Icones tab.* 1153. A. Gardneriana, *Miers. Ann. and Mag. of Nat. Hist. series* 2, *vol.* ix. *p.* 389.

Var. α. Leaves coriaceous obtuse at the apex, panicles short rigid.

Var. β. Leaves membranaceous, broader than in var. α. with a long narrow acumination at the apex terminating in a sharp or obtuse point, panicles lax and much larger than in variety α.

Variety α.—Nilgiris, Anamallays, Travancore, Tinnevelly hills and Ceylon, elevation 5000-7500 feet. Vary β. northern slopes of the Nilgiris, Travancore (Myhendra coffee estates,) elevation 3,000 feet. The 2 varieties have a very different appearance, and I long thought them distinct, but a careful analysis of the flowers shows no difference, and variety β. may I think be safely considered only a lower level more membranaceous form, it is a much handsomer tree than the variety found at higher elevations. The figure is taken from living specimens of var. α gathered on the Nilgiris.



Govindoo, del. Dumphy. Lith.

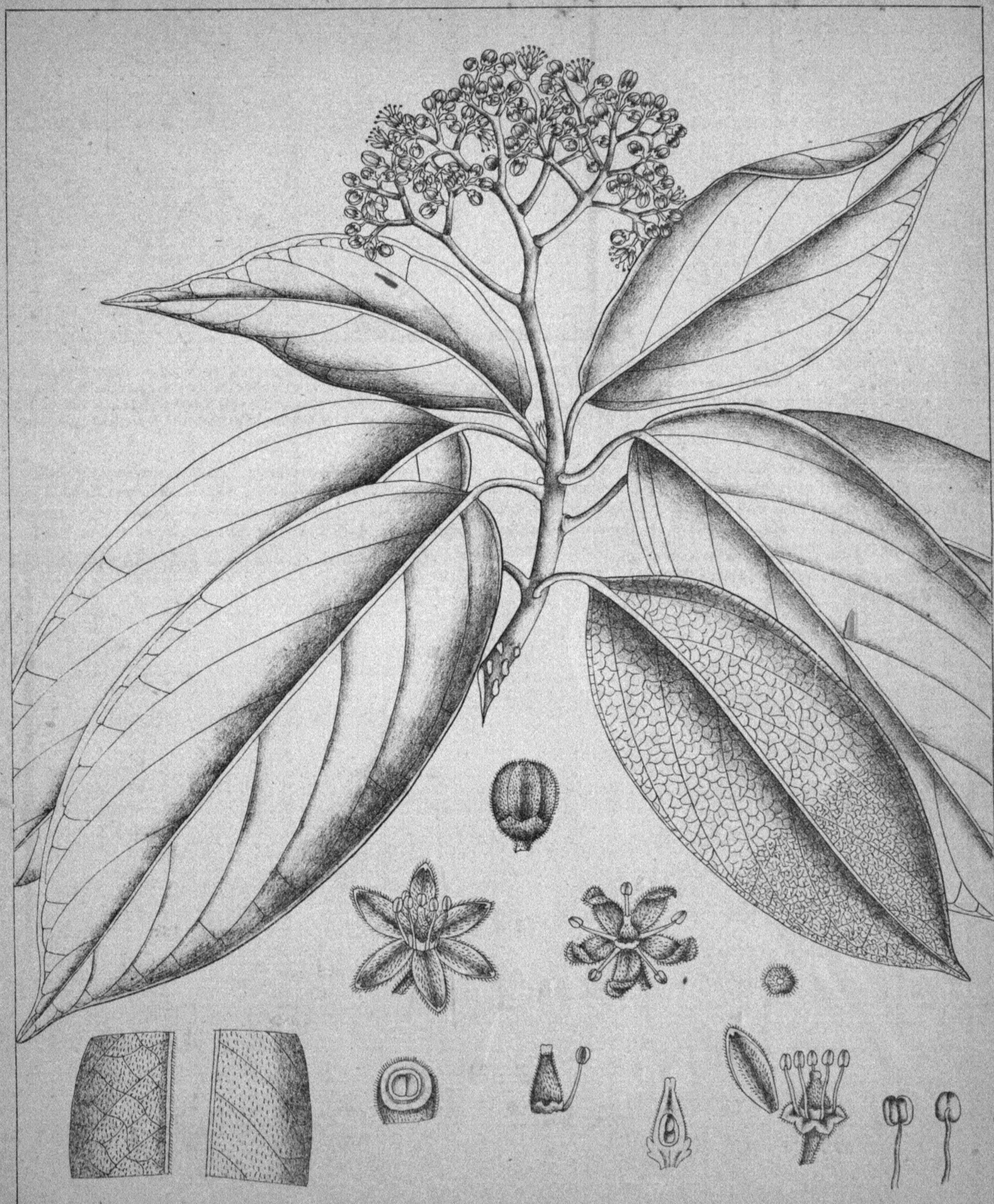
Apodytes Benthamiana (Wight)

MAPPIA FŒTIDA. (Nat ord. Olacineæ.)

MAPPIA, *Jacq.*—GEN. CHAR. Flowers polygamous, calyx small 5 toothed, petals 5 hypogynous valvate villous, stamens 5 hypogynous alternate with the petals, anthers oblong affixed by the back connective often mucronate, disk cupulate surrounding the ovary or sometimes inconspicuous, ovary 1 celled, style short, stigma thick, ovules 2 pendulous, drupe slightly fleshy with a 1 seeded crustaceous or woody nut, seed pendulous, embryo in the apex of the albumen, radicle superior, cotyledons broad foliaceous. Trees pubescent or glabrous, leaves alternate entire or sinuate, cymes lax terminal corymbose.—Leretia, *Vell.* Stemonurus, *Wight* (not *Blume*).

MAPPIA FŒTIDA. (Wight.) A good sized tree polygamous, leaves elliptic oblong acuminate, pubescent beneath 4-7 inches long by about 2-3 broad, petioles ½-¾ inch long, flowers 3-4 lines in expansion yellowish very fetid, in corymbose terminal panicles, everywhere villous with short hairs, stamens glabrous, style about as long as the ovary, drupe succulent olive-like purple, nut thin. *Wight Icones*, 955. Mappia fœtida, ovata, Gardneriana, et Championiana, *Miers. Ann. & Mag. of Nat. Hist. Ser.* 2 *Vol.* ix. 395 7.

A very common tree in the moist forests of the western side of the Madras Presidency and in Ceylon from no great elevation up to 7-8000 *feet, it is very abundant on the Nilgiris. In Ceylon it is called Gandapaana, the figure is taken from living specimens gathered at Ootacamund.*



Govindoo, del. Dumphy, Lith.

Mappia fœtida (Wight)

ILEX DENTICULATA. (Nat. ord. Ilicineæ.)

ILEX. *Linn.*—GEN. CHAR. Flowers unisexual or hermathrodite, calyx small persistent 4 6 cleft, petals 4-6 connate at the base into a rotate corol hypogynous imbricate, stamens as many as the petals and alternate with them and inserted on the corol, anthers oblong, ovary sessile sub globose 4-6 (rarely 7-8) celled, style none or short thick, rarely elongate, stigmas as many as the ovary cells, distinct or combined, ovules 1-2 in each cell collateral, drupe globose, putamen 4-5 celled, or with 4-8 long or crustaceous pyrenes. Trees or shrubs, leaves alternate generally shining entire or toothed or spinose, inflorescence axillary.—Pseudehretia, *Turcz.*

ILEX DENTICULATA. (Wall.) A very large tree glabrous or the young parts minutely puberulous, leaves very coriaceous glabrous and rather shining above, paler beneath ovate to oblong, acute acuminate or obtuse at the apex serrated, 2½ to 3½ inches long by 1-1¾ broad, petioles ¼ to ½ an inch long channelled above, peduncles axillary very short, pedicels numerous minutely puberulous 3-4 lines long simple or again bearing 3 pedicels, flowers tetramerous, petals only connate at their very base at least in the male flowers (I have no fertile flowers for dissection), stamens inserted at the very base of the corol on to the connate portion between the petals. *Wight Ill. tab.* 142.

This large timber tree is not uncommon on the higher ranges of the Nilgiris and Anamallays at 6000 8000 *feet, and at similar elevations in Ceylon, its timber is much valued and is said not to warp or crack, it is at once distinguished from the other species by its serrated leaves and* 4 *merous flowers.*

Govindoo, del. Dunphy, Litho.

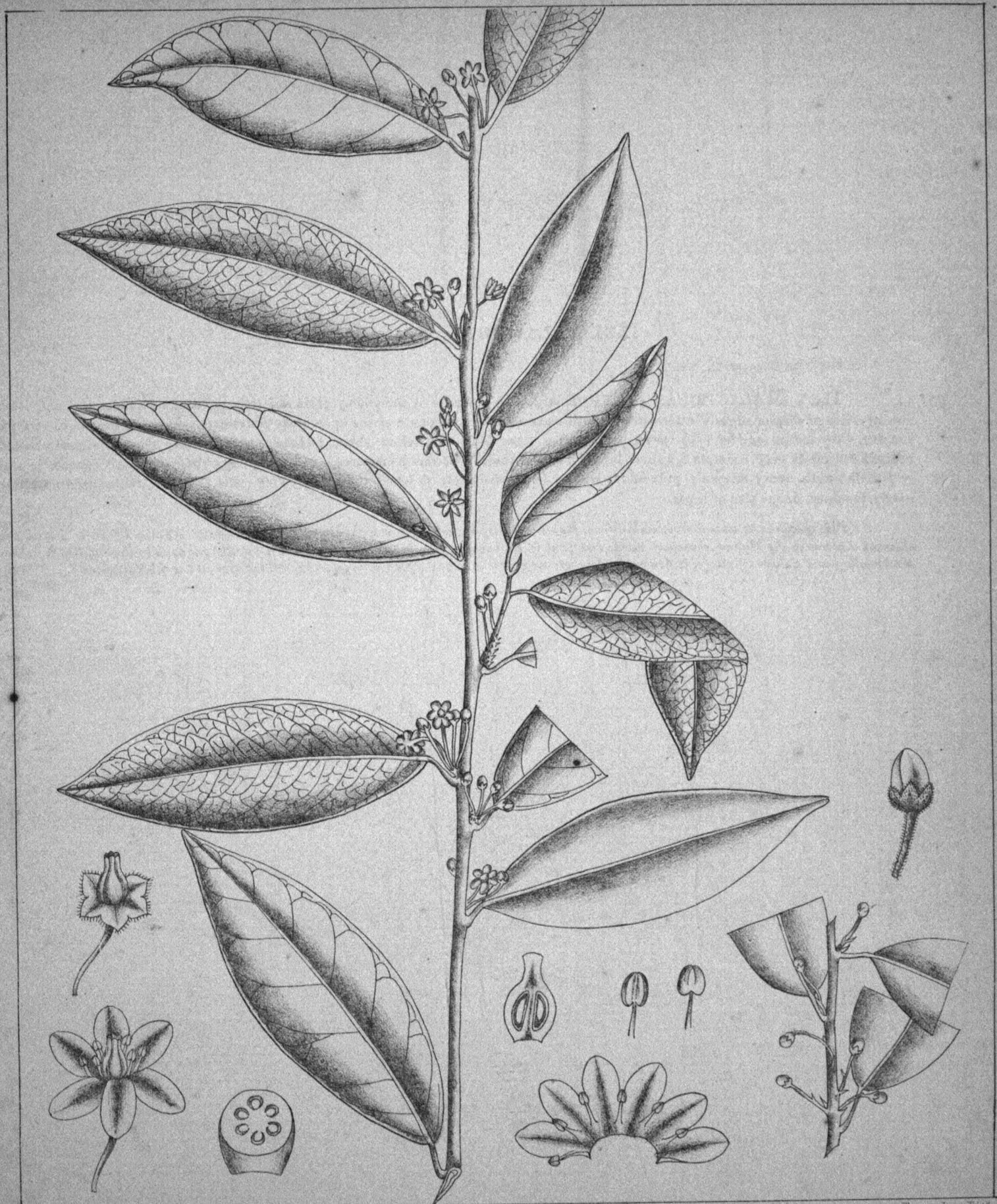
Ilex denticulata (Wall.)

ILEX MALABARICA. (Nat. order Ilicineæ.)

For Gen. Char. see Pl. cxlii,

ILEX MALABARICA. (Bedd.) A large tree glabrous or the young parts minutely puberulous (under the lens) leaves narrow oblongo elliptic slightly attenuated at both ends acute or acuminate at the apex quite entire dark shining green above very pale beneath, 4-5½ inches long by 1-1½ broad, petioles 3-4 lines long channelled above, peduncles axillary very short or almost obsolete, pedicels 3-8 rarely only 1 simple 3-4 lines long slightly pubescent, flowers hexamerous, calyx slightly pubescent, petals connate to nearly ½ their length, ovary minutely puberulous with a large obsoletely 6 lobed stigma, 6 celled, cells 1 ovuled, ovules pendulous from nearly the apex, drupe size of a pea.

This species is at once distinguished from the others by its 6 merous flowers, the leaves and inflorescence are also different. I have only observed this tree in the Wynad, elevation 3,000 feet (but it probably occurs elsewhere in our western forests); it is abundant at Benni between Mudumallay and Sultan's Buttery, it flowers in January and February and probably more or less all the year as the other species do.



Gwyn Jdoo, del. Dumphy, Lith.

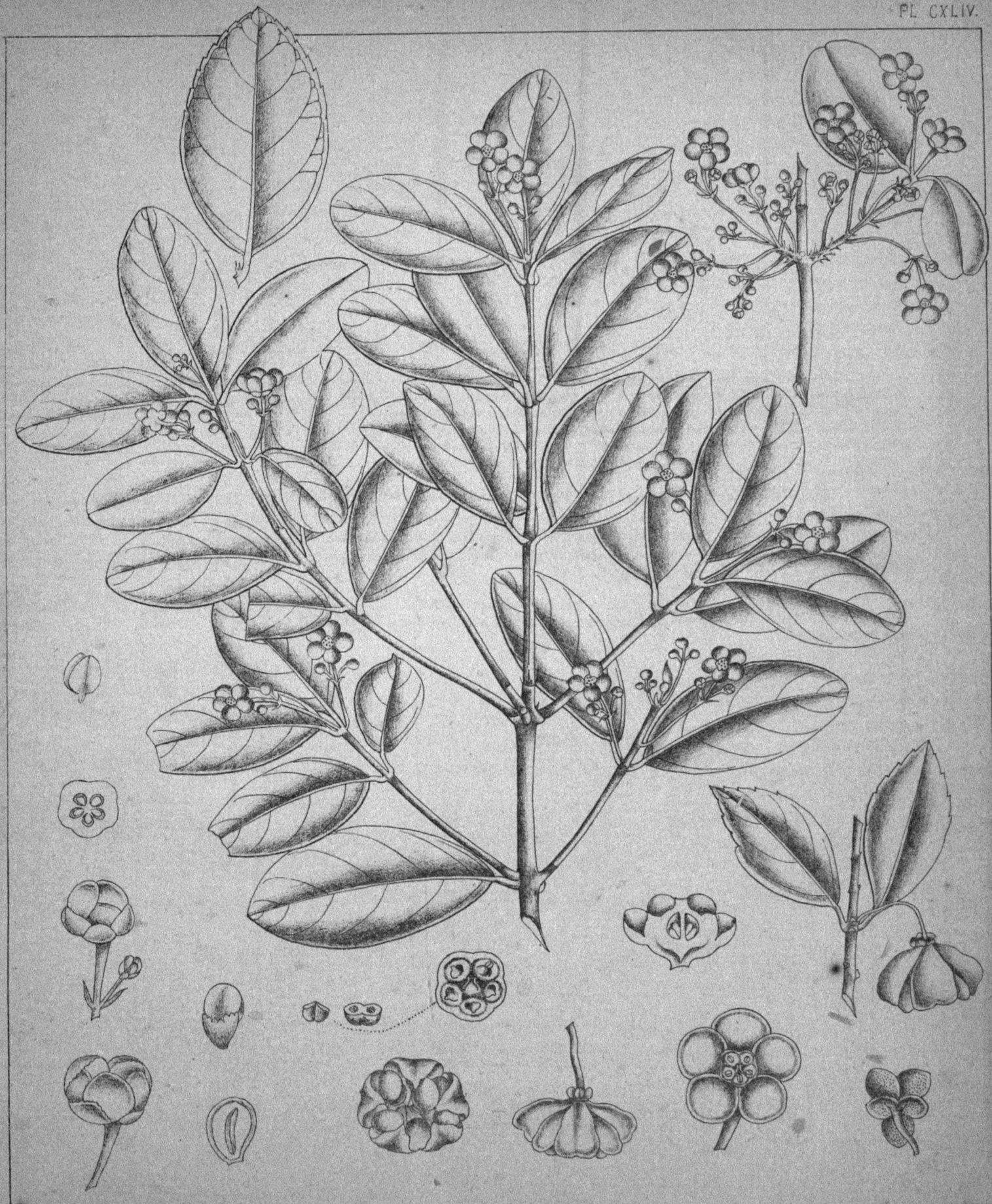
Ilex Malabarica (Bedd.)

EUONYMUS CRENULATUS. (Nat. ord. Celastrineæ.)

EUONYMUS. *Linn.*—GEN. CHAR. Calyx 4-6-fid, divisions patent or recurved, petals as many inserted below the disk patent entire toothed or fimbriate, stamens the same number inserted on the disk, filaments generally very short, anthers broad didymous, disk fleshy ample 4-5-lobed, ovary immersed in the disk and confluent with it, 3-5 celled, styles short, stigma 3-5 lobed, ovules 2 (rarely 4 or many) in each cell, capsule 3-5 celled with the same number of lobes or angles and opening loculicidally in as many valves, cells 1-2 seeded, seeds nearly enclosed in a colored usually scarlet arillus, testa chartaceous, albumen fleshy, embryo orthotropal, cotyledons foliaceous, radicle inferior. Trees or shrubs, with opposite leaves, flowers dull reddish or greenish in axillary dichotomous or trichotomous cymes.—Melanocorya, *Turcz.* Vyenomus, *Presl. Walp. Ann.* 1. 188.

EUONYMUS CRENULATUS. (Wall.) A small tree, leaves elliptic obtuse crenulate-serrate towards the apex, coriaceous deep shining green above, 2-2½ inches long by 1-1¼ broad, petioles about 3 lines long, peduncles solitary shorter than the leaves once or twice dichotomous few flowered, flowers 5 or occasionally 6-merous, petals orbicular, stamens very short, anthers opening transversely, margin of the torus free, style very short, stigma blunt somewhat umbilicated, capsule turbinate 5 celled, lobed at the apex, seed with a small aril. *WA. Prod. p.* 161.

A small tree common on the Nilgiris, Pulneys and higher parts of Western ghats of the Madras Presidency, the wood is white, very hard and close grained, and answers for wood engraving, and is about the best substitute for Boxwood in this Presidency; the wood of the other species is very similar.



Govindoo del. Dumphy, Lith.

Euonymus crenulatus, (Wall)

ORDER XXVIII.—CELASTRINEÆ.

Gen. Char.: Flowers regular, hermathrodite or polygamous. Calyx small, persistent, 4 or 5 cleft, rarely 3 or 6 cleft. Petals as many as calyx segments, spreading, imbricate or rarely valvate in the bud. Stamens as many as petals and alternate with them, inserted round the base or on the margin of the disk, or upon the disk itself; filaments usually short incurved; anthers short, 2 celled, the cells in a few genera confluent into one. Disk usually conspicuous, more or less fleshy, flat or broadly cup-shaped, or thick and conical, nearly free, or adnate to the base of the calyx or confluent with the ovary. Ovary sessile on the disk, 2 to 5 celled, tapering to a short style with an entire or lobed stigma, ovules usually 2 in each cell, ascending with a ventral raphe, occasionally several, rarely 1 only or pendulous with a dorsal raphe. Fruit a capsule, berry, drupe, or samara, rarely divided into distinct carpels. Seeds usually enveloped in an arillus, sometimes winged; albumen fleshy or almost horny or none; embryo usually rather large, with flat cotyledons and a short radicle next to the hilum. Trees or shrubs, occasionally thorny; or woody climbers. Leaves opposite or alternate, entire or toothed. Stipules minute and very deciduous or none, rarely large and encircling the young leaf bud, deciduous. Flowers small, white or greenish, in axillary cymes or small racemes or in terminal panicles.

A considerable S. Indian Order, the peculiar disk readily characterizes the greater number of the genera; where that is wanting (as in some species of Microtropis) the insertion of the ovules and inferior radicle are the chief points separating this order from Ilicinæ; from Rhamneæ, with which the real affinity is much closer, the stamens alternating with the petals is a constant distinctive mark.

The genus Euonymus which is abundant in the moist western forests of this Presidency and in Ceylon, yields 6 small trees and 1 shrub, all of which have a very hard close grained wood which might be used as a substitute for box, and which is well worth attention. Microtropis grows in the same localities and is represented by 4 small trees or shrubs with wood very similar to that of Euonymus. Glyptopetalum yields 2 large shrubs both common to our moist western forests, one of them also being found in Ceylon. Lophopetalum is only represented by one species, a lofty tree peculiar to our western forests, most abundant in S. Canara, where the timber is much in use for building purposes (under the name of Balpale). Kokoona also has only one representative, a lofty tree peculiar to Ceylon. Pleurostylia yields one small tree not uncommon in our dry subalpine forests on both sides of the Presidency and in Ceylon. Celastrus represented in all our dry forests by small rigid often thorny shrubs and by 1 small tree. Kurrimea and Trochisandra, closely allied genera, are each represented by only 1 species (lofty trees), the former peculiar to Ceylon and the latter to our western forests (Anamallays 3-6000 feet.) Elæodendron has two species both trees, one common in Ceylon, and the other common throughout this Presidency. Hippocratea and Salacia are abundantly represented by climbing shrubs.

Tribe I, CELASTREÆ.—Stamens the same number as the petals inserted round the disk or on its margins, seeds albuminous.

Sub-tribe, EUONYMEÆ.—Leaves opposite.

* Fruit capsular dehiscent.

α. Ovules 1-2 in the cells (rarely many in Euonymus.)

Petals free, ovules 2 (rarely more) fixed to the axis..	...EUONYMUS.
Petals free, ovules solitary pendulous...	...GLYPTOPETALUM.
Petals combined...	...MICROTROPIS.

β. Ovules 4 or more in the cells.

Seed albuminuous with an aril, not winged..	...LOPHOPETALUM.
Seed exalbuminous exarillate winged...	...KOKOONA.

* * Fruit indehiscent .. ..PLEUROSTYLIA.

Sub-tribe, CELASTREÆ—Leaves alternate (except in Elæodendron.)

* Fruit dehiscent.

Style 1, stigma 3-4 lobed	...CELASTRUS.
Styles 2, fruit entire	...KURRIMIA.
Styles 2, stamens on a ring-like stamen tube, fruit 2 lobed	...TROCHISANDRA.

* * Fruit indehiscent.

Leaves opposite and alternate, fruit an olive-like drupe	...ELÆODENDRON.

Tribe II, HIPPOCRATEÆ.—Stamens usually 3, with a 5 merous calyx and corol inserted on the disk, albumen none.

Fruit of distinct usually dehiscent carpels, seeds winged	...HIPPOCRATEA.
Fruit baccate indehiscent, seeds not winged...	...SALACIA.

EUONYMUS.

For Gen. Char. see letter press to Pl. cxliv.

1. EUONYMUS CRENULATUS, *Wall.*—For description, &c., see Pl. cxliv.

2. EUONYMUS DICHOTOMUS, *Heyne.*—A small tree, leaves coriaceous from narrow oblong-lanceolate to ovate-lanceolate tapering at both ends blunt at the point quite entire, about 3 inches long by ½-1¾ inches broad, petioles 3 lines long, peduncles solitary or 2-3 together from simple to twice or thrice dichotomous, few flowered, one-third to half the length of the leaves, petals 5 orbicular, style scarcely any, stigma blunt, capsule turbinate tapering downwards 5 winged towards the apex. *Heyne in Roxb. Fl. Ind. (ed. Wall.)* 2, *p.* 410;—*WA. Prod. p.* 160.

A small tree common in various parts of the western forests of the Madras Presidency up to 4000-4500 feet, it is very common in the moist forests above Ponachy on the Anamallays; the wood is very hard, close grained, and answers as a substitute for box in wood engraving.

3. EUONYMUS GOUGHII, *Wight.*—A small tree glabrous, leaves entire ovate oblong acute at both ends acuminate about 3 inches long by 1¼ broad, petioles 3-4 lines long, peduncles axillary generally only 1-2 lines long sometimes elongate about 1 inch long,

1-3 flowered, pedicels ¼ inch long. flowers pentamerous, petals orbicular fimbriated on the margin, ovary immersed in the disk 5 celled with 2 ovules in each cell, fruit about 1 inch long turbinate very broad at the apex rather acutely 5 winged. *Wight Ill. p.* 178 ;— *Icones tab.* 215.

A small or middling sized tree not very uncommon throughout the western ghat forests of the Madras and Bombay Presidencies. It is at once known from the other S. Indian species by its fimbriated petals. My Tinnevelly specimens (1,500 feet elevation) have the peduncle only about 1 line long and the pedicels the length of the petiole. My Coorg and S. Canara specimens (3-4000 feet) have the peduncle 1 inch long, they both agree in foliage, in the fimbriate petals and sharply angled fruit. It is an exceedingly elegant tree and is common about Mercara ; it is probably the E. Indicus of Heyne.

4. EUONYMUS ANGULATUS, *Wight.*—A small tree, branches acutely angled and furrowed between, leaves quite entire very coriaceous glabrous, deep shining green above paler beneath, and the veins very indistinct, ovate with a very cordate base and subsessile, to ovate-lanceolate shortly petioled, 2½-4½ inches long by 1½-2 broad, flowers in lax axillary or supra-axillary cymes which are from ½ as long to much longer than the leaves and several times dichotomous, flowers large dull red, 5-6 merous, calyx entire or fimbriate on the margin, petals orbicular, capsule turbinate much attenuated downwards obtusely winged at the apex. *Wight Icones tab.* 1,053. Euonymus acutangulus, *Wight Ill. p.* 178. Euonymus pterocladus, *Hohenacker in Herb. Kew.*

A very elegant small tree only observed on the Nilgiris and in Coorg, it is common on the Sisparah ghat, it is easily distinguished from the others by its very opaque almost veinless leaves and large lax cymes.

5. EUONYMUS SERRATIFOLIUS, *Bedd.*—A glabrous shrub, branches terete, leaves glabrous scarcely coriaceous more or less sharply and prominently serrated from narrow-lanceolate to broad-lanceolate tapering at the apex into a small blunt point 3½-4 inches long by ¾-1½ broad, petioles ¼ inch long, cymes axillary generally several together filiform from ⅓ as long to nearly as long as the leaves, flowers 5-merous, petals orbicular, capsule nearly globose with 5 rounded lobes.

I have only observed this elegant species on the slopes of the Nilgiris (Ouchterlony valley 3000 feet) and on the Carcoor ghat, Wynad, it does not grow to more than a shrub, whereas all the other species become small trees, it is known by its prominently serrated leaves and very filiform cymes.

6. EUONYMUS REVOLUTUS, *Wight.*—A middling sized or small tree, young shoots obtusely 4 angled at length terete, leaves sometimes tern coriace ous, revolute on the margin quite entire or slightly crenated towards the apex, oval roundish to rather obovate obtuse at the apex, 2 inches long by 1¼ broad, petioles 1-2 lines long, peduncles axillary generally in pairs from ¼ to ½ as long as the leaves 1-3 flowered, when 1 flowered furnished with 2 bracteoles at the insertion of the pedicel, flowers 5 merous, petals orbicular. *Wight Ill. p.* 178. Nearly allied to E. crenulatus.

Ceylon, at high elevations in the Central provinces.

7. EUONYMUS WALKERI, *Wight.*—A small tree, branches terete slender, young shoots obscurely 4 sided, leaves glabrous slightly coriaceous subsessile, lanceolate to ovato-lanceolate with a long tapering apex, rather prominently serrated above the middle, 3-4 inches long by 1-1¼ broad, inflorescence on very short axillary, dichotomous peduncles, only 2-3 lines long, flowers 5 merous petals orbicular undulate on the margin, capsule turbinate 5 angled. *Wight Ill.* i. *p.* 178.

Ceylon, abundant up to 3000 feet, distinguished from the other species by its very short inflorescence.

There is an undescribed downy-leaved species of this genus on the Anamallays (Anagoondy Shola), a large shrub, but I have only seen it in fruit.

GLYTOPETALUM. THW.

Gen. Char. : Calyx small 4 lobed, lobes imbricate, petals 4 patent or reflexed sometimes furnished with 2 hollow pits on the upper side near the apex, disk large 4 lobed, stamens 4 inserted on to the disk, filaments subulate or very minute, anther cells divaricate at the apex of a thick connective. Ovary immersed in the disk and confluent with it, 4 lobed 4 celled, style short or wanting, ovules solitary in the cells pendulous from the apex of the axis, capsule subglobose coriaceous, tardily dehiscent 1-4 celled, 1-4 seeded, seed as in Euonymus. Glabrous shrubs with 4 angled branches, leaves opposite serrate or subentire, cymes axillary or supra-axillary, flowers yellow.

1. GLYPTOPETALUM ZEYLANICUM, *Thw.*—A large shrub, leaves glabrous opposite lanceolate very sharply serrate except at the base, acute at the apex, 4-6 inches long by 1½-2½ broad, petioles ¼ inch long, cymes axillary or supra axillary, dichotomous at the apex with a single flower in the fork, secondary peduncles at right angles with the peduncles and 3 flowered at the apex, peduncles 1-1½ inches long with small bracteoles at the apex, secondary peduncles ½ inch long bracteoled at their apex, pedicels ½ inch long, the 2 lateral ones bracteoled below the middle, flowers yellow 4-5 lines in expansion, petals patent or reflexed each with 2 pits on the inside near the apex, ovary slightly 4 lobed tapering upwards into a short conical style, capsule round 1-4 seeded, seed ½ an inch long half hid in the red aril. *Thw. En. Pl. Zey. p.* 73.

Anamallays (Anagoondy sholas) 2000 feet. Tinnevelly and Travancore ghats, 2-3000 feet. Ceylon. The dissections and analysis are taken from Tinnevelly specimens. I have not seen the Ceylon plant, but there can be no doubt that they are identical.

Analysis of Genera. Pl. IX, fig. 5.

GLYPTOPETALUM ZEYLANICUM.

1. A bud showing the imbricate sepals and petals.
2. A flower open.
3. The same, petals removed.

4. An anther.
5. Ovary cut horizontally.
6. Ovary cut vertically.
7. Fruit cut vertically.

2. GLYPTOPETALUM GRANDIFLORUM, *Bedd.*—A large glabrous shrub, leaves glabrous opposite oval to ovate lanceolate acute at the apex, entire or obscurely serrated towards the apex, 4-7 inches long and up to 3 inches broad, petioles about 3 lines long, peduncles supra-axillary filiform slender 4-6 inches long, dichotomously 3 flowered at the apex and furnished with minute scale-like bractes at the insertion of the pedicel, pedicels about 1 inch long recurved ebracteolate, flowers tetramerous ¾-1 inch in expansion bright yellow, petals patent or reflexed without pits, anthers subsessile, connective very large. *Bedd. Icones. Pl. Indiæ Orientalis tab.* cii.

This very beautiful shrub I have only met with in the Wynad 2500-3000 feet, it is not uncommon about Devala.

MICROTROPIS. WALL.

Gen. Char.: Flowers sometimes unisexual, sepals 5 imbricate, persistent, petals 5 (rarely 0) imbricate, rounded, connate at the base into a short ring; disk none, or ring like and connate with the petals, or free; stamens 5 inserted on the apex of the disk or in its absence on the ring at the base of the corol, each stamen being alternate with a petal, ovary free ovoid, 2-3 celled generally imperfectly, style thick, stigma 2-4 lobed, ovules 2 in each cell fixed by pairs collaterally at or a little above the centre of the axis, capsule oblong coriaceous 1 celled 2 valved 1 seeded, tardily dehiscing, seed erect oblong, albumen fleshy, cotyledons foliaceous. Trees or shrubs glabrous, leaves opposite entire coriaceous, flower small white in peduncled axillary cymes or in sessile fascicles, seed with a red succulent testa resembling an arillus.—Paracelastrus, *Mig. Fl. Ind. Bat.*

A genus allied to Ile by its monopetalous corol and defective disk.

1. MICROTROPIS RAMIFLORA, *Wight.*—A middling sized tree, leaves very coriaceous oblongo-lanceolate to oval or obovate obtuse or slightly emarginate, 1-3 inches long by ½-2 inches broad, petiole 1-2 lines long, flowers aggregated in dense clusters along the naked branches, peduncle from ½ to 2 lines long, calyx scariose at the margin, petals somewhat obovate slightly jagged at the margins, fruit oblong obtuse, testa succulent reddish orange. *Wight Icones tab.* 976.

This tree is common at Ootacamund and on the higher ranges of the Anamallays, Pulneys, &c., and in Ceylon; the timber is worthy of attention.

Analysis of Genera, Pl. IX, fig. 6.

1. A flower bud.
2. A flower.
3. The same open, showing the disk or stamen tube adnate to the base of the corol, the 5 petals of which are combined into a ring at the base.
4. Anthers, front and back view, showing the filament apiculate at the apex and attached to the back of the anther nearly at the top.
5. Ovary cut transversely, showing it imperfectly divided into cells.
6. The same cut vertically.
7. A fruit.
8. The same cut vertically, showing the embryo and inferior radicle.
9. The same cut transversely.

2. MICROTROPIS DENSIFLORA, *Wight.*—A small tree or large shrub, leaves coriaceous glabrous broad oval obtuse, about 3 inches long by 1¾ broad, cymes axillary erect compact many flowered 12-18 lines long, bracts apiculate, capsule slender cylindric pointed, testa crimson. *Wight. Ic. tab.* 1052.
Nilgiris, western slopes.

3. MICROTROPIS OVALIFOLIA, *Wight.*—A large shrub or small tree, leaves coriaceous oval or ovate, shining above paler beneath 2-2¾ inches long by ¾ to 1½ inch broad, petiole 2-3 lines long, cymes axillary once or twice dichotomous 1 to nearly 2 inches long, petals orbicular, fruit oblong attenuated at the base, apiculate at the apex. *Wight Icones tab.* 976, *et* M. microcarpa, *l. c. tab.* 975.

Common on the higher ranges of the Nilgiris and Pulney mountains.

4. MICROTROPIS WALLICHIANA, *Wight MS.*—A large shrub or small tree, leaves very variable in texture and size, from subcoriaceous to very coriaceous, bright shining green above, pale or almost white beneath, oblong to almost obovate acute or with a longish sudden point up to 8 inches long and to 3¼ broad, petioles 2-4 lines long, flowers sessile or subsessile in axillary generally very dense sometimes few flowered clusters, fruit oblong ½ an inch long with a whitish rind, testa scarlet. *Wight MS;—Thw. En. Pl. Zey. p.* 71.

A very variable species, common throughout the western forests of this Presidency and in Ceylon, up to 5000 feet elevation. My Ceylon specimens quite correspond with some of the less coriaceous forms of S. India.

LOPHOPETALUM. WIGHT.

For Gen. Char. see letter press to Pl. cxlv.

1. LOPHOPETALUM WIGHTIANUM, *Arnt.*—For description, &c. see Pl. cxlv.

KOKOONA. THW.

For Gen. Char. see letter press to Pl. cxlvi.

1. KOKOONA ZEYLANICA, *Thw.*—For description, &c. see Pl. cxlvi.

PLEUROSTYLIA. WA.

Gen. Char. : Calyx small 4 lobed, petals 5 much larger than the calyx, stamens as many inserted below the disk, filaments short flat, anthers with a broad connective at the back, opening longitudinally; disk thick fleshy crenulate, ovary half immersed in the disk and confluent with it, 1 celled, style short thick, stigma broadly peltate, ovules two in each cell erect, fruit indehiscent 1 celled, sarcocarp thin and fleshy marked on one side about the middle with the remains of the style, endocarp a crustaceous membrane separable from the sarcocarp and having several clefts at the base, seed erect solitary (rarely 2,) covered with the aril-like endocarp, testa coriaceous, albumen copious fleshy, cotyledons large orbicular flat. A small tree with angled branches, leaves opposite entire, cymes axillary short few flowered. *WA. Prod. p.* 157.

1. PLEUROSTYLIA WIGHTII, *WA.*—A small tree or large shrub, glabrous, leaves from narrow lanceolate to broad-lanceolate or oval, occasionally obovate, 1½-2 inches long, petioles about 3 lines long, cymes about the length of the petioles, flowers about 1½ lines in diameter, fruit oblong rather attenuated at the base 2½-3 lines long, 1½ lines in diameter. *WA. Prod. p.* 157. Celastrus? Wightiana, *Wall.* Celastrus opposita, *Wall. in Roxb. Fl. Ind.* (*ed Wall.*) ii. 398. Pleurostylia Heynei, *WA. Prod. p.* 157.

A small tree common in the subalpine forests of the Madras Presidency,

Analysis of Genera, Pl. X, fig. 1.

1. A bud magnified.
2. A flowering branch magnified, showing the ovary semi-immersed in the disk and the stamens attached below the margin of the torus.
3. Anther, front view.
4. Anther, back view, showing the large connective.
5. Ovary cut vertically, showing the single cell and 2 erect ovules.
6. Fruit branch, natural size.
7. A seed, the aril-like endocarp separated so as to bring the globose seed in full view.
8. A seed cut vertically.

CELASTRUS. LINN.

Gen. Char. : Flowers frequently polygamous. Calyx 5 partite or 5 fid. Petals 5, sessile usually spreading. Stamens 5 inserted upon or under the margin of the disk; anthers dehiscing longitudinally. Ovary 2-3 (rarely 4) celled, free or more or less confluent with the disk; style short; stigma with as many lobes as cells in the ovary or subcapitate. Ovules 2 in each cell. Capsule globose or obovoid, often trigonous, 3-2-1 celled, with 1 or 2 seeds to each cell, dehiscing loculicidally. Seeds with a fleshy albumen, frequently more or less invested by a fleshy arillus. Shrubs or trees, frequently armed with axillary spines. Leaves alternate, usually more or less coriaceous and serrulate or toothed. Flowers small in cymes or racemes.—Gymnosporia, *WA.* Orixa, *Thunb.*

1. CELASTRUS SENEGALENSIS, *Lam.*—A small tree, glabrous, usually glaucous or pale green, unarmed or young shoots often spinescent at their extremities (purplish) and bearing leaves and flowers, leaves very variable in size and form, coriaceous elliptic to obovate usually very obtuse or retuse occasionally subacute, tapering at the base into the petiole, serrulate or sometimes nearly entire, ¾ to 4 inches long by ⅓rd to 2 inches broad, petiole from 1 to 6 lines usually dilating into the lamina, cymes axillary solitary or fascicled, usually considerably shorter than the leaves, forking from or below the middle, from loose to rather compact, ovary broad based surrounded by a fleshy disk 2-3 celled, in the fertile flower with a deeply 2-3 cleft style, capsule globose or obovoid 3 angled, about the size of a pea and blackish when dry, 2-3 valved with 1-2 seeds in each cell. *Lam.*;—*DC. Prod.* ii. 8. Celastrus montana, *Roxb. Fl. Ind.* i. 620.

A small tree, sometimes only a shrub, common throughout the Presidency in dry jungles both in the plains and subalpine forests; in Teligu it is called Pedda chintu (the smaller species, C. emarginata, being called Chintu); its wood is very hard and durable, and much in use for ploughs and various purposes with the natives; it is also found in Africa and Australia.

Analysis of Genera, Pl. X., fig. 2.

1. A leaf and cyme of flowers, natural size.
2. A bud.
3. A full flower.
4. The same, petals removed.
5. Anthers, front and back view.
6. Ovary cut vertically, showing the erect ovules.
7. Ovary cut transversely, showing its 3 cells, each 2 ovuled.

2. CELASTRUS EMARGINATA, *Willd.*; 3. C. OVATA, *Wall.*; 4. C. WALLICHIANA, *Spr.*; 5. C. ROTHIANA, *WA.*; and 6. C. HEYNEANA, *Roth.*; are only shrubs of small size, generally thorny; they are all closely allied, at least in their flowers. C. paniculatus, *Willd*, is a climber common in all our jungles.

All the above are described in Wight and Arnott's Prodromus. C. fruticosa, a Ceylon shrub described by Thwaites in his *En. Pl. Zey.*, is scarcely distinct from some of the small leaved forms of C. montana.

KURRIMIA. WALL.

For Gen. Char. see letter press to Pl. cxlvii.

1. KURRIMIA CEYLANICA, *Arnt.*—For description, &c. see Pl. cxlvii.

TROCHISANDRA. Bedd.

For Gen. Char. see letter press to Pl. cxx.

1. Trochisandra Indica, *Bedd.*—For description, &c. see Pl. cxx.

ELÆODENDRON. Jacq.

For Gen. Char. see letter press to Pl. cxlviii.

1. Elæodendron Roxburghii, *WA.*—For description, &c. see Pl. cxlviii.

2. Elæodendron glaucum, *Pers.*—A middling sized or small tree, trunk straight, bark smooth olive colored, branches numerous, leaves opposite short petioled oblong and cuneate oblong, acutely or obtusely serrate, coriaceous hard and polished, the upper side shining, rather obtuse at the apex, 3-4 inches long by about 2 broad, panicles axillary shorter than the leaves dichotomous, flowers pedicelled small greenish yellow, bractes small oblong 1-3 at the base of each pedicel and at the divisions of the panicle, flowers 5-merous, calyx caducous, ovary immersed on the very large 5-gonal green fleshy disk 2 celled with 2 ascending ovules in each, style short conical, stigma simple obtuse, drupe nearly round, size of a cherry, smooth pulpy olive colored 1 celled, nut oval a little rugose 2 grooved, very thick and hard, 1-2 celled. *Roxb. Fl. Ind. (ed Wall.) vol.* ii. *p.* 432.

A common tree in Ceylon from the sea level up to 4500 feet. Roxburgh mentions that it is a native of various parts of India, but I have not observed it in this Presidency.

HIPPOCRATEA. Linn.

Gen. Char.: Flowers hermaphrodite. Sepals 5. Petals 5, exceeding the sepals, erect or spreading, imbricate or valvate. Stamens 3, filaments recurved or reflexed at the tip, usually dilated around the ovary below or concealed in lateral notches of the ovary. Anthers various, from quadrate to transversely elongate-oblong, extrorse, rarely subsessile, ovary surrounded by or raised upon a disk, 3 celled; style very short or subulate or 0; stigma terminal, 3 lobulate or subentire, or stigmatic, lobes 3, under the margin of the ovary; ovules 2-10 in each cell 2 seriate. Fruit carpels 3, distinct flat, rarely nearly cylindrical, coriaceous, usually dehiscing along the median line. Seed compressed, usually dilated into a broad wing below, exalbuminous; cotyledons flat, connate; radicle very short, inferior. Climbing shrubs, leaves opposite, entire or serrate. Flowers in axillary cymes or more rarely terminal cymose panicles, usually small.

A genus of climbing shrubs. The following species inhabit Southern India:—1. H. Indica, *Willd.* 2. H. obtusifolia, *Roxb.* 3. H. Arnottiana, *Wight.* and 4. H. Grahami, *Wight.* The two first are also found in Ceylon and are described in Wight and Arnott's Prodromus; the last two are described by Dr. Wight in his *Illustrations.*

Analysis of Genera, Pl. X, fig. 3.

Hippocratea Arnottiana.

1. A flower.
2. Anther, showing its 1 cell.
3. Ovary cut transversely, 3 celled with 2 ovules in each cell.
4. Ripe fruit burst.
5. A seed removed.
6. A seed cut transversely.
7. The same cut longitudinally to show the inferior radicle.

All magnified from Dr. Wight's Ill.

SALACIA. Linn.

Gen. Char.: Flowers hermaphrodite. Sepals 5. Petals 5. Stamens 3. Anthers variously 2 celled or lobed; cells distinct or confluent, or 1-celled (4-locellate). Filaments usually inserted within or upon a disk. Ovary 3-celled; style very short, or subulate; stigma terminal; ovules 2 or more in each cell. Fruit baccate, undivided, 1-3 celled, 1 or several seeded. Climbing or straggling shrubs. Leaves opposite or subopposite, coriaceous, subentire or serrulate. Flowers small, usually in axillary sessile or very shortly pedunculate fascicles.—Johnia, *Roxb. Fl. Ind.* i. *p.* 168. Anthodon et Raddisia, *DC. Prod.* 1. Tontelea, *Walp. Rep.* 1. Diplesthes, *Harv. in. Hook. Lond. Journ.* 1. 19.

A genus of climbing or straggling shrubs, scarcely ever deserving the name of trees. The following species inhabit S. India and Ceylon:—1. S. oblonga, *Wall.* 2. S. reticulata, *Wight.* 3. S. prionoides, *DC.* 4. S. Brunoniana, *WA.* 5. S. pomifera, *Wall.* 6. S. macrosperma, *Wight.* 7. S. diandra, *Thw.* The first three are common both to S. India and Ceylon, and 4, 5, and 6 are only found in S. India, and 7. peculiar to Ceylon; they are all described in Dr. Wight's works, except S. diandra, which is described in Dr. Thwaites' *Enumeration.*

Analysis, Pl. X, fig. 4.

Salacia oblonga.

1. A flower.
2. The same, sepals forced open and petals removed.
3. Stamens showing the 2 celled anther.
4. Ovary cut transversely
5. A ripe fruit.
6. The same cut transversely.
7. A seed, the adhering pulp removed.
8. The same cut transversely.

All magnified, except the fruit and seed, from Wight's Illus.

ORDER XXIX.—RHAMNEÆ.

Gen. Char.: Flowers regular, hermaphrodite, or rarely polygamous. Calyx campanulate, urceolate, or cylindrical, the tube persistent and often adnate to the ovary or disk; lobes 4 or 5, valvate, usually with a raised longitudinal line inside and deciduous. Petals 4 or 5, concave or hood-shaped, inserted at the base of the calyx-lobes, alternating with and rarely exceeding them, or none. Stamens 4 or 5, alternating with the calyx-lobes, inserted with the petals and opposite to them when present; filaments short, filiform; anthers small, often enclosed in the petals, rarely oblong or exserted. Disk rarely wanting, usually filling the calyx-tube or lining it, or annular round the ovary when inferior, rarely cup-shaped and free. Ovary sessile on the disk or immersed in it, or more or less inferior, 3 celled, or rarely 2 or 4 celled; style short, entire, or with as many lobes or branches as ovary cells; stigmas terminal, capitate or club shaped. Ovules solitary in each cell, erect, anatropous, with a dorsal or rarely lateral raphe. Fruit a drupe or capsule, the border of the adnate base of the calyx forming a ring at the base or round the fruit or at the summit; epicarp thin and dry or fleshy; endocarp separating into as many membranous coriaceous or hard cocci as cells, or woody or bony divided into cells. Seed solitary, erect, usually ovate and somewhat compressed, often arillate; testa coriaceous or crustaceous and shining or rarely membranous; albumen fleshy, or almost horny, often scanty, rarely wanting; embryo usually straight with flat rather thick cotyledons and a short inferior radicle. Shrubs, trees, or climbers. Leaves alternate or rarely opposite, undivided, entire or toothed. Stipules usually present but very deciduous, rarely spinous and persistent. Flowers small, usually green or yellowish, in cymes or umbel-like clusters, either solitary or forming axillary or terminal compound cymes, racemes or panicles.

Leaves 3-5 nerved at the base, drupe succulent, the putamen woody or bony 1-4 celled	...ZIZYPHUS.
Leaves 3-nerved a little above the base, penninerved upwards, drupe with a thin epicarp, covering membranous or crustaceous cocci	.. COLUBRINA.
Leaves penninerved, ovary sessile on the disk	. RHAMNUS.
Leaves penniveined, ovary immersed in the disk	...SCUTIA.

Of little importance as a forest order. Zizyphus jujuba is the well known Ber tree and yields a timber of some value, but there is nothing else of importance to the forester. Z. xylopyra, rugosa, and glabrata, are small trees, and nummularia, Œnoplia, and napeca are shrubs all (except the last, which is peculiar to Ceylon) common throughout S. India; colubrina yields a small tree, Rhamnus two shrubs and a small tree, and Scutia one thorny shrub. Noltia Africana, Harv. et Sond. (Vitmannia, WA. Prod. 166) is a common hedge shrub or small tree on the Nilgiris, but has been introduced from the Cape of Good Hope. Ventilago is a climbing genus represented by two S. Indian plants. V. Madrasapatana, Gœrtn., and V. calyculata, Tut., and a third doubtful species, V. Bombaiensis, Dalz., which has a strong resemblance to my Zizyphus Wynadensis (Icones Pl. cxiv) but with larger leaves, also differing in being distantly crenated instead of sharply serrated. When the fruit of these two species is discovered, they will I think be found to be congeneric if not identical, and will perhaps form a new genus; my plant is a lofty tree which I myself saw felled at Devala in the Wynad. Gouania, also a climbing genus, has two S. Indian species, G. leptostachya, DC., and G. microcarpa, DC.—Sageretia affinis, Bl. (= Berchemia parviflora, Wall. in WA. Prod.) is a common climbing plant, and Helinus, also a climbing genus, is represented by one species (undescribed) lately detected by me in the Nagpur country. Cordage is made from bark of V. Madrasapatana; and the plant yields a valuable dye known as pupli in the Salem district.

ZIZYPHUS. Juss.

For Gen. Char. see letter press to Pl. cxlix.

The species may be distinguished as follows:—1. Z. jujuba, an edible 2 celled fruit, leaves tawny brown beneath. 2. Z. xylopyra, leaves whitish beneath, fruit 3 celled not edible. 3. Z. rugosa, flowers in a panicle, nut thin. 4. Z. glabrata, unarmed, leaves glabrous except when very young. 5. Z. napeca, *Lam.*, armed leaves, glabrous except on the veins. 6. Z. nummularia, *WA.*, thorns long and slender, leaves small 7. Z. Œnoplia, leaves very oblique.—Zizyphus Wynadensis, *Bedd.* (*Icones tab.* cxiv.) with penninerved leaves can scarcely be a Zizyphus, and has the appearance of a Ventilago, but it is a lofty tree. I shall defer future notice of it in this work until its fruit has been found.

1. ZIZYPHUS JUJUBA, *Lam*.—For description, &c. see Pl. cxlix.

2. ZIZYPHUS XYLOPYRA, *Willd.*—A tolerably large tree, or sometimes in poor soil only a straggling shrub, bark light ash-colored much cracked and corky; thorns, the under one recurved, the upper erect or rather incurved always present in a poor soil, but often absent in good soil; leaves broadly oval to orbicular obtuse, 3 sub 5 nerved slightly cordate and often unequal sided at the base, serrulate, under side softly pubescent and whitish finely reticulated, upper sub pubescent when young at length glabrous from 1 to 2 inches long by nearly as broad, petioles 3-4 lines long, cymes axillary generally shorter than the petioles, ovary 3 celled, styles 3 united below, drupe the size of a cherry oval greenish and downy, nut hard and thick nearly globose slightly rugose, 3 celled. *Willd. Sp.* 1. *p.* 1104;—*Roxb. Fl. Ind.* 1. *p.* 611, also Z. elliptica, *Roxb. l. c. p.* 610, and Z. caracutta, *Roxb. l. c. p.* 612. Z. orbicularis, *DC. Prod.* ii. *p.* 21.

Common in almost every forest in the Presidency and in Ceylon, it is called Ghont in Hindoostanee and Gote in Teligu; the wood of the larger trees is much esteemed, it is yellowish or orange colored, not heavy but hard and durable, it is used for building purposes and for ploughs and various other uses, and makes excellent torches; the fruit is used to make blacking, the leaves are good as fodder.

3. ZIZYPHUS RUGOSA, *Lam.*—A small tree or more often only a straggling shrub, prickles stipulary short and recurved with a broad densely pubescent base, usually solitary, leaves broadly oval 3-nerved serrate, young ones downy beneath, at length nearly glabrous except on the nerves, 4-6 inches long, cymes long peduncled forming on the leafless branches a large terminal panicle, ovary 3-celled, styles 2 united at the base, drupe obovate, size of a cherry, with a very thin 1-celled 1 seeded putamen. *Lam. Encycl. Meth.* 3. *p.* 319. Z. latifolia, *Roxb. Fl. Ind.* 1. 607.

Very common in dry subalpine jungles on the western side of the Presidency, rarer on the eastern side, common in Ceylon, where it is called Maha-erraminya; it is only used as fuel as far as I have observed; the fruit is eaten.

4. ZIZYPHUS GLABRATA, *Heyne.*—A small tree unarmed, young branches pubescent, leaves 3 nerved and beautifully reticulated ovate oblong obtuse crenate-serrate glabrous except on the nerves beneath, retuse or often slightly cordate and unequal sided at

the base, glossy and coriaceous, 1-5 inches long by 1-2½ broad, petioles 3-4 lines long, stipules filiform pubescent caducous, cymes scarcely longer than the petioles, flowers green or greenish yellow, stamens longer than the petals, ovary 2 celled, styles 2 nearly distinct, drupe spherical or turbinate the size of a cherry with soft gelatinous sweet pulp, nut obovate rugose flattened, hard and thick, 1-2 celled. *Heyne in Roth. Nov. Sp. p.* 159. *Z.* trinervia, *Roxb. Fl. Ind.* i. *p.* 606.

A very pretty small tree with dark green glossy foliage not uncommon in the western forests of the Madras Presidency and in Mysore.

5. ZIZYPHUS NAPECA, *L.*—A shrub, branches terete, the young ones tomentose, thorns solitary or twin, leaves ovate-lanceolate crenate-serrate obtusely acuminate minutely apiculate oblique at the base, 3-5 nerved, glabrous except on the veins, 2-3 inches long by ¾-1¼ broad, petioles 3 lines long pubescent, cymes about ⅓rd the length of the leaves tomentose, styles 3-4 joined to about the middle, ovary 3-4 celled, fruit globose about 8 lines in diameter fleshy, greenish-purple, 2-4 seeded, putamen bony rugulose.—Rhamnus napeca, *Linn. Fl. Zeyl.* 87. *Z.* lucida, *Moon. Cat. p.* 17, *and Thw. En. Pl. Zeyl. p.* 74.

A thorny shrub common in Ceylon.

6. ZIZYPHUS NUMMULARIA, *Burm.*—A shrub, branches from near the root slender flexuose whitish; thorns stipulary in pairs, the upper one straight slender very sharp and about as long as the leaves, the under one much shorter and recurved; leaves 3-nerved ovate oval or orbicular serrulate, above pretty smooth, beneath with a short dense greyish tomentum, about ⅛ an inch long, cymes sessile very short, ovary 2-celled, styles 2 united to above the middle.—Rhamnus nummularia, *Burm. Ind. p.* 61. *Z.* microphylla, *Roxb. Fl. Ind.* i. *p.* 613. *Z.* rotundifolia, *DC. Prod.* ii. 21.

A very common thorny bush throughout the Presidency.

7. ZIZYPHUS ŒNOPLIA, *Mill.*—A large straggling often climbing shrub, young shoots pubescent, thorns stipulary large and sharp, the lower one recurved, the upper straight; leaves 3 nerved very obliquely ovate acuminate, acute or obtuse or retuse at the base, slightly serrulate or almost entire, under side shortly tomentose, cymes short, ovary 2-celled, styles 2 combined to above the middle, drupe globose shining black size of a pea, nut rugose 1 rarely 2-celled. *DC. Prod.* ii. *p.* 21. *Z.* Œnoplia and napeca, *Roxb. Fl. Ind.* i. *p.* 611 *&* 613.

A most common hedge plant throughout the Madras Presidency, and in Ceylon, where it is called Erraminya-wel; its fruit is eaten and is a pleasant acid, the bark and root are used medicinally.

COLUBRINA. LINN.

Gen. Char.: Calyx-tube hemispherical; limb 5 cleft; lobes spreading, triangular. Petals 5, clawed, inserted below the disk, hood-shaped. Stamens 5, included in the petals; filaments filiform; anthers ovate, 2-celled. Disk fleshy, filling the calyx-tube. Ovary immersed in the disk and adhering to it, 3 celled, tapering into a 3-lobed style with obtuse stigmas. Capsule nearly globular, slightly 3-lobed, dehiscing septicidally into 3 membranous or crustaceous cocci. Epicarp dry and thin or succulent, the persistent calyx-tube covering about one-third of its length. Seeds obovoid, compressed, 3-gonous; testa smooth, shining, coriaceous; albumen fleshy, thin. Cotyledons flat or incurved. Trees or shrubs. Leaves alternate, 3-nerved at the base or penninerved. Stipules small deciduous. Flowers small, in axillary clusters.

1. COLUBRINA ASIATICA, *Brong.*—A small tree unarmed, branches slender, leaves ovate or broadly cordate gradually narrowed into an obtuse or acute point at the apex or abruptly acuminate, rotundate or sub-cordate at the base, crenate-serrate, 3 sub 5 nerved a little above the base, penninerved upwards, glabrous and shining, but the costa above and the costa and veins beneath are sometimes furnished with a few hairs, 2-3 inches long by 1½-1¾ broad, petioles 3-12 lines long; flowers small green in short pedunculate axillary cymes about the length of the leaves, fruit 3-4 lines in diameter, slightly depressed at the top, furrowed opposite the dissepiments, dehiscing into 3 rarely 4 cocci. *Brong in Ann. Sc. Nat.* x. *p.* 369. Ceanothus Asiaticus, *L. Roxb. Fl. Ind. vol.* i. *p.* 615. *C.* capsularis, *DC. Prod.* ii. 32.

A small tree not uncommon on the western side of the Madras and Bombay Presidencies, and in Ceylon (north of the island.)

Analysis, Pl. X, fig. 5.

1. An axillary cyme, natural size.
2. A branch in fruit, natural size.
3. A flower magnified, front view.
4. The same, back view.
5. A petal and stamen detached.
6 & 7. Anther, front and back view.

RHAMNUS. LINN.

Gen. Char.: Flowers hermaphrodite or polygamously dioecious. Calyx-tube urceolate; limb 4-5 lobed; lobes triangular-ovate, erect or spreading, keeled inside. Petals 4, 5 or none, inserted on the margin of the calyx-tube considerably above the ovary, hood-shaped or flat. Stamens 4 or 5, with very short filaments. Disk clothing the calyx-tube, margin thin. Ovary free, ovoid, 3 or 4-celled. Styles 3 or 4; stigmas obtuse papillose. Drupe baccate, globose or oblong, encircled at the base by the calyx-tube, with 2-4 pyrenes; pyrenes horny or cartilaginous, dehiscing inwardly or indehiscent. Seeds obovate; testa membranous or crustaceous, smooth or furrowed at the back; raphe dorsal, ventral or lateral; albumen fleshy. Cotyledons flat or with recurved margins, thin; radicle short. Shrubs or trees, leaves alternate or sub-opposite, petiolate, deciduous or evergreen, penninerved, entire or dentate. Stipules small, deciduous. Flowers axillary, racemose or cymose.

1. RHAMNUS WIGHTII, *WA.*—A large shrub unarmed, nearly quite glabrous, young parts turning black in drying, leaves alternate or occasionally subopposite, elliptic-lanceolate with a short sudden mucronated-acumination, rather coriaceous, glabrous and shining, but (under the lens) slightly puberulous on the veins beneath and occasionally a few minute hairs on the lamina above, furnished beneath with inconspicuous hairy-glands in the axils of the veins, sharply and closely serrated, the serratures tipped with an incurved black point, 2½-3½ inches long by 1-1½ broad, petioles about ¼ an inch long, pedicels axillary fascicled very short (the axils of the leaves are generally furnished with small leaf and flower bearing ramuli which are often so reduced as to appear like peduncles), inflorescence minutely puberulous (under the lens), flowers greenish-yellow 3 lines in expansion ; calyx 5-cleft ; petals very small spathulately-obovate apiculate, cucullate ; ovary red 3-4 lobed 3-4 celled, styles as many as the lobes joined to the middle and then diverging, fruit roundish, red, 3 lines in diameter, seed with a deep furrow at the base on the outer side. *WA. Prod. p.* 164. Ceanothus Wightiana, *Wall. L. N.* 4,264.

A common shrub in the more elevated parts of the western forests of Madras and Bombay, and on the Ceylon mountains.

2. RHAMNUS HIRSUTUS, *WA.*—A large shrub or small tree, generally scraggy, young branches pubescent spinescent, older ones glabrous whitish, leaves opposite or alternate ovate or lanceolate with a short sudden acumination, serrulate, membranaceous, nearly glabrous above, beneath hairy particularly on the nerves and veins, pedicels from the base of the young shoots 3-6 together pubescent, as long as the petiole, calyx 4 cleft, petals obovate obtuse entire flat, ovary 2-3-celled, styles 2-3 connected to the middle then diverging, the upper part jointed with and deciduous from the persistent lower half, fruit 2-celled, seeds plano-convex with a deep furrow at the base on the outer convex side. *WA. Prod. p.* 165.

Not uncommon on the slopes of the Nilgiris, Pulneys, Tinnevelly hills, and elsewhere on the western mountains of the Madras Presidency.

Analysis of Genera, Pl. X, fig. 6.

1. A portion of a branch in flower.
2. Under side of a leaf.
3. A flower.
4. Petal and anther removed.
5. Ovary and styles.
6. A flower cut open.
7. An ovary cut vertically.
8. The same cut horizontally.

All copied from Wight's drawing.

3. RHAMNUS ARNOTTIANUS, *Gard. MSS.*—A small tree, young branches puberulous, leaves glabrous ovate-lanceolate to elliptic lanceolate, crenate, glandulosely serrulate, obtusely acuminate, depressedly-reticulated above, hairy in the axils of the lower veins beneath, 1½-2¾ inches long by ¾-1¼ inches broad, petioles channelled and puberulous on the upper side 2-4 lines long, stipules linear lanceolate 2½ lines long glandular at the base internally, early deciduous, but the glandular portion persistent, peduncles axillary tern puberulous 1-flowered about 7-8 lines long, calycine segments 4 acute externally pilose deciduous, stamens 4, filaments short, styles 2-3 combined at the base, fruit the size of a small pea, blackish-purple. *Thw. En. Pl. Zeyl. p.* 74.

A small tree inhabiting the most elevated parts of Ceylon.

SCUTIA. COMM.

Gen. Char.: Flowers hermathrodite, calyx 5 cleft, tube hemispherical or turbinate, lobes ovate thickened at the apex acute petals 5 unguiculate erect plane or cucullate, disk fleshy lining the tube of the calyx closely surrounding the ovary but not cohering with it, ovary ovoid or globose immersed in the disk free 2-4 celled, style short 2-4 fid, stigmas papillose obtuse, fruit obovoid or subglobose dry or slightly fleshy girt at the base by the persistent tube of the calyx, pyrenes 2-4 crustaceous angled or compressed, seed compressed, testa membranaceous or subcoriaceous, albumen none or thin, cotyledons plano-convex subfleshy glabrous. Shrubs unarmed or spinose, branches generally angled, leaves alternate approximated by pairs, or nearly opposite entire or serrulate, penninerved, stipules minute deciduous, flowers fascicled or congested in small axillary umbellules.

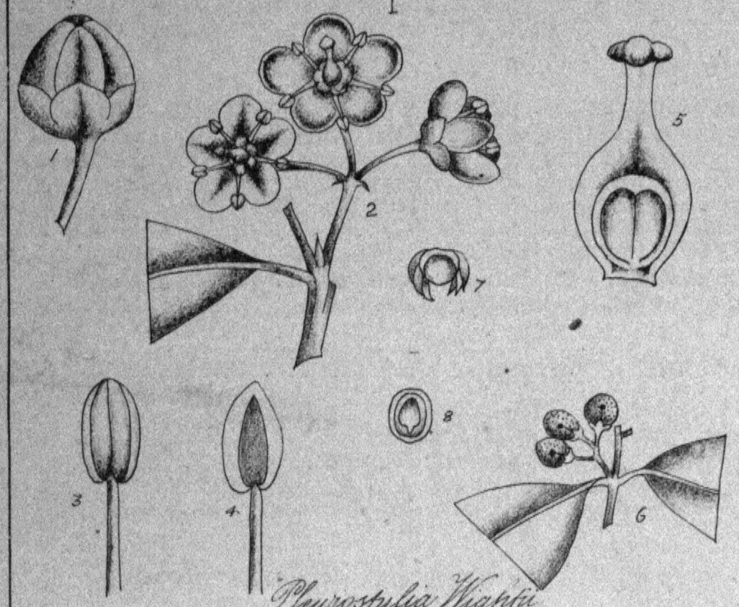
SCUTIA INDICA, *Brong.*—A shrub armed with subopposite recurved prickles or sometimes almost unarmed, trunk short soon dividing into many long straggling sub-scandent branches, leaves sub opposite, distant, firm and shining, ovate orbicular or obovate, quite entire or serrulate, usually obtuse, or retuse at the apex with or without a mucro, sometimes acute ¾-1½ inches long, petioles 2-3 lines long, umbellules usually a little shorter than the petioles 5-12 flowered, calyx globosely campanulate, teeth deciduous in fruit, petals very small crescent-shaped emarginate, style very shortly 3-fid, fruit size of a pea. *Brong in Ann. Sc. Nat.* 10, 363 ;—*Wight. Ill. tab.* 73. S. Rheediana, *Wight. Icones tab.* 1071. Rhamnus circumscissa, *L. Roxb. Fl. Ind.* i. 603. Ceanothus circumscissa, *DC. Prod.* ii. 30 ;—*Rheede Mal. 5. t.* 30, 31.

A common shrub throughout the Madras Presidency and in Bombay and Ceylon.

Analysis, Pl. XI, fig. 1.

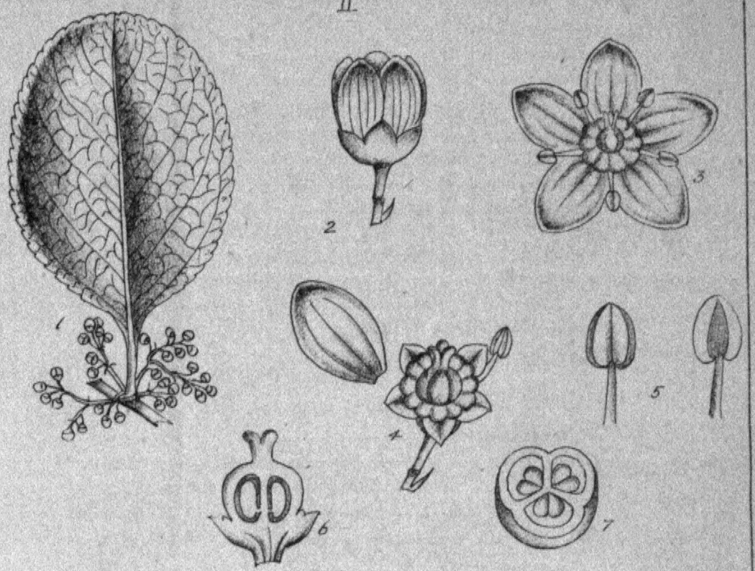
1. A bud.
2. A full flower.
3. Same forced open.
4. A petal and stamen.
5. A petal opened.
6. Anther, front and back view.
7. Ovary and style.
8. The same cut vertically.
9. The same cut horizontally.
10. A fruit.

I



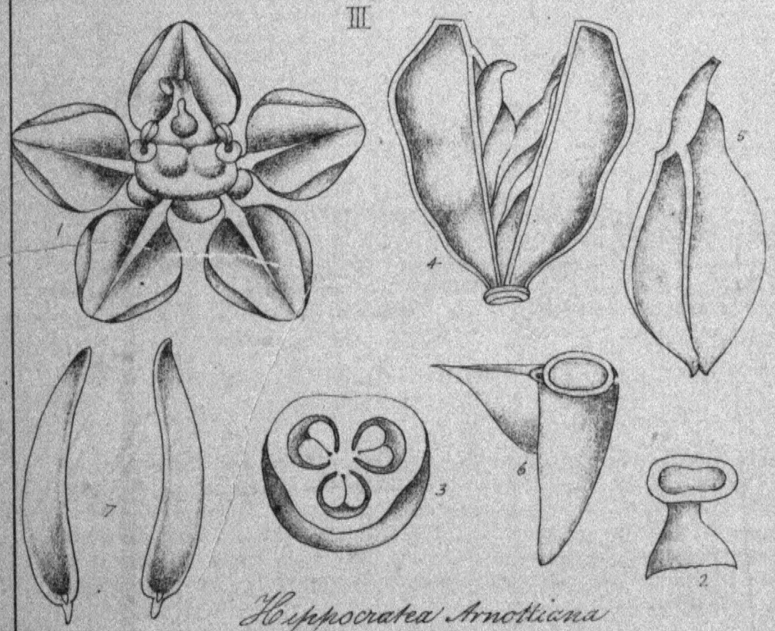
Pleurostylia Wightii

II



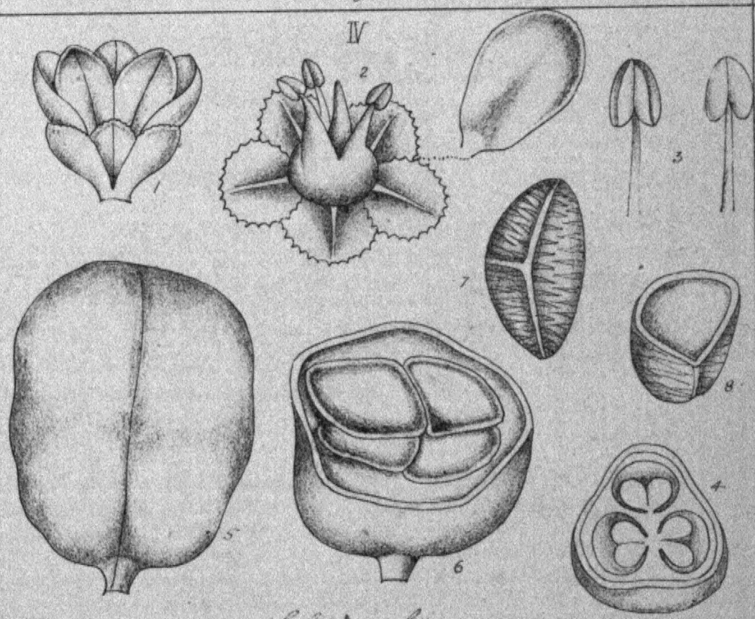
Celastrus Senegalensis

III



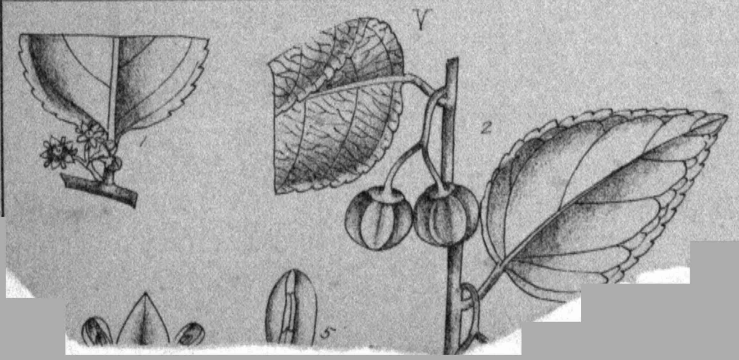
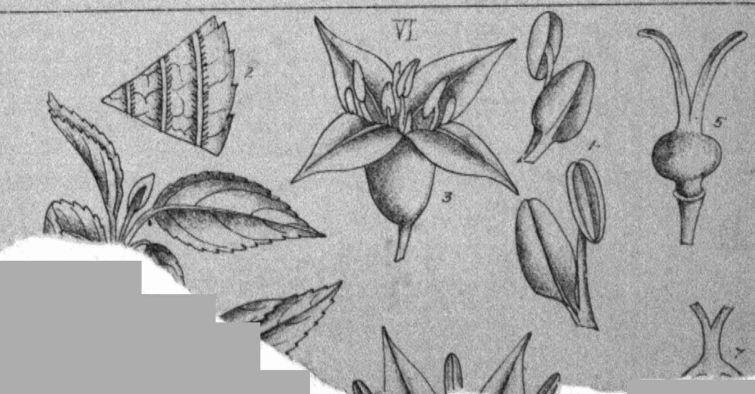
Hippocratea Arnottiana

IV



Salacia oblonga

V



VI